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ARCHIVES OF OPHTHALMOLOGY.

MYCOSIS OF THE CHOROID FOLLOWING CATARACT EXTRACTION, AND METASTATIC CHOROIDITIS OF THE OTHER EYE, PRODUCING THE CLINICAL PICTURE OF SYMPATHETIC UVEITIS.

By Dr. F. H. VERHOEFF, Boston.

(From the Massachusetts Charitable Eye and Ear Infirmary.)

(With six illustrations on Text-Plates XXII., XXIII.)

THE case here reported seems to be the only one of its kind hitherto recorded, and is possibly of significance in regard to the origin of Sympathetic Uveitis.

CASE.

Anna A., aged 30 years, a native of Albania, was admitted to the Massachusetts Homeopathic Hospital, May 8, 1922, with a diagnosis of congenital cataracts. Vision O.D. $\frac{10}{200}$, O.S. $\frac{10}{200}$. The patient was later discovered to be pregnant. Owing to the nervous condition of the patient an attempt to operate upon her under local anesthesia had to be abandoned.

On May 12th, under ether narcosis, cataract extraction with capsulotomy was performed, the cataract being removed by means of a spoon with some loss of vitreous. After the operation the patient persistently vomited for several days and repeatedly tore the bandage from her eyes.

On May 19th, the wound was still gaping but appeared to

be covered with conjunctiva and there was a shallow anterior chamber. A mass filled the pupil.

May 30th, the patient was discharged with the wound edges nearly approximated.

June 22, 1922, the patient consulted Dr. H. B. Chandler, who states that the right eye showed a gaping wound within which was a yellowish gray substance. The eye was tender, congested, and had a tension of about + 2. Vision was nil. The left eye showed a fairly well dilated pupil, tension normal, and media too cloudy for fundus to be seen. Vision fingers at 12 inches. Diagnosis: Sympathetic Uveitis.

August 9, 1922, the patient gave birth to a healthy male infant.

January, 1923, the patient was again seen by Dr. Chandler. The right eye was only slightly congested and the wound had contracted. The left eye showed well advanced glaucoma. The patient was referred to the Massachusetts Charitable Eye and Ear Infirmary.

April 2, 1923, the patient was admitted to the Infirmary on my service. She was poorly nourished but, aside from the ocular condition, appeared to be in good health. She stated that she had never had any serious illness. Five months after the cataract operation in the right eye she first noticed pain and blurred vision in the left eye. During the past few days the pain has been intense.

On examination the right eye was found shrunken and the cornea cloudy. It was only slightly congested. Vision nil. The left eye was considerably congested and extremely painful. The cornea was hazy and showed Descemetitis. The anterior chamber was of good depth. The iris was discolored, the pupil small and blocked by membrane. Vision nil. Diagnosis: Sympathetic Uveitis. Under ether narcosis the left eye was enucleated.

April 7, 1923, the right eye became extremely painful, but enucleation was refused.

April 11th the right eye was enucleated under ether narcosis.

April 30th the patient was referred to the Massachusetts General Hospital for a thorough physical examination with special reference to the possibility of systemic actinomycosis. The examination gave negative results with the exception that the tonsils were found enlarged and the teeth in bad condition. X-ray examination of the teeth showed multiple pus pockets. X-ray examination of the chest was negative. Wassermann test, negative.

June, 1923, an intradermal test was made by me with a freshly prepared emulsion of the choroid of an ox. The result was negative.

ILLUSTRATING DR. F. H. VERHOEFF'S ARTICLE, "MYCOSIS OF THE CHOROID FOLLOWING CATARACT EXTRACTION, AND METASTATIC CHOROIDITIS OF THE OTHER EYE, PRODUCING THE CLINICAL PICTURE OF SYMPATHETIC UVEITIS."

FIG. 1. Section of the right eye. Wound of cataract operation not shown. The eye is shrunken due to cicatricial contraction. The inflammatory process is confined to the choroid. Hematoxylin and eosin. Photo. × 1.8.

FIG. 2. Section of the left eye, showing inflammatory process limited chiefly to the choroid. The globe is enlarged as a result of glaucoma. Hematoxylin and eosin. Photo. × 1.8.

FIG. 3. Large abscess projecting from choroid. Left eye. Hematoxylin and eosin. Photo. × 9.2.

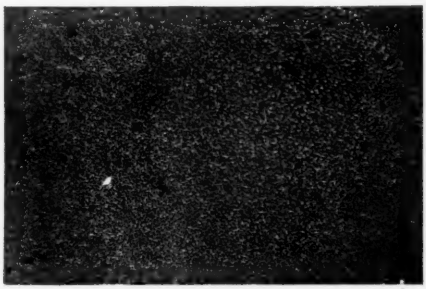

FIG. 4. Organisms in abscess stained in phosphotungstic acid hematoxylin. Left eye. Photo. × 67.

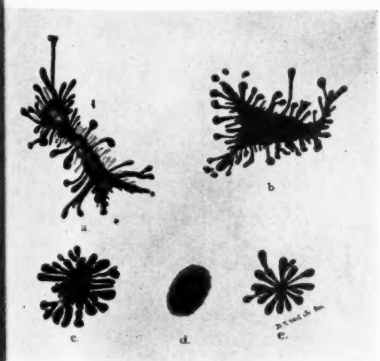

FIG. 5. Types of organisms seen in abscesses, stained in phosphotungstic acid hematoxylin. Drawing. Oil immersion objective.

ILLUSTRATING DR. F. H. VERHOEFF'S ARTICLE, "MYCOSIS OF THE CHOROID FOLLOWING CATARACT EXTRACTION, AND METASTATIC CHOROIDITIS OF THE OTHER EYE, PRODUCING THE CLINICAL PICTURE OF SYMPATHETIC UVEITIS."

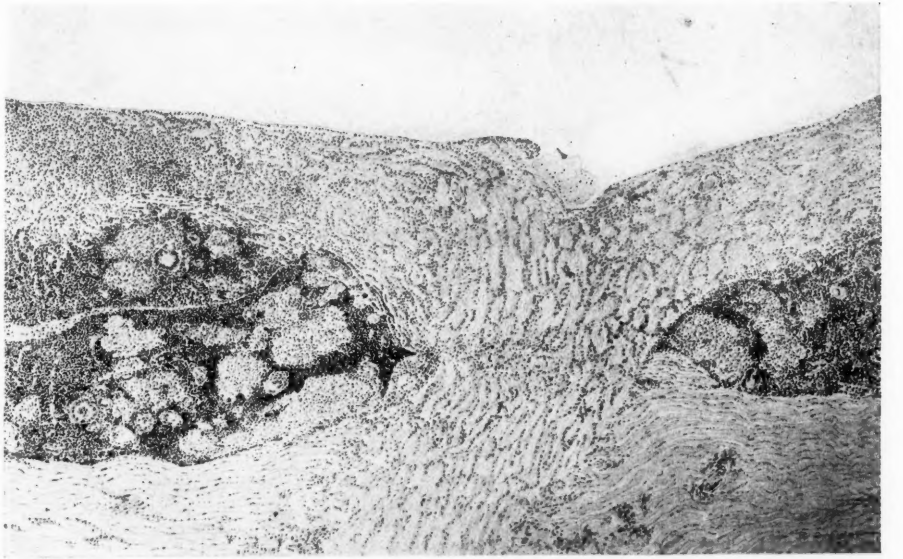

FIG. 6. Section of optic nerve and choroid showing foci of epithelioid cells and giant cells as in sympathetic uveitis. Left eye. Drawing.

March 27, 1924, the general condition of the patient remains unchanged.

PATHOLOGICAL EXAMINATION, RIGHT EYE.

Macroscopical.—The globe is slightly shrunken and somewhat distorted. (Fig. 1). It measures *20mm* anteroposteriorly and *18.5mm* horizontally. The anterior chamber is *2mm* deep. The lower pupillary margin of the iris is drawn up and is adherent to tissue filling the wound of operation, thus obliterating the pupil and coloboma. No lens substance is visible. The vitreous chamber is almost completely filled with tissue which leaves, however, an ovoid space anteriorly, *3½mm* × *7mm* in size, containing the original vitreous. The iris is adherent to this tissue. The sclera seems thickened. The choroid and retina are unrecognizable but the ciliary body can still be made out.

Microscopical.—The cornea shows moderate deeply seated vascularization and slight diffuse infiltration with pus cells. The endothelium is intact and shows no precipitates. The anterior chamber is filled with serum and fibrin but is almost free from cells. The cataract incision passes *1mm* anterior to the canal of Schlemm and does not involve the ciliary body. The corneal lip of the wound is curved in and separated from the other lip by dense fibrous tissue which in places is markedly infiltrated with lymphocytes and plasma cells. This continues into the mass of tissue behind the iris, is firmly united with the ciliary processes, and has drawn up the pupillary margin from below. Almost no lens substance remains, and the lens capsule is incorporated in a mass of chronic inflammatory tissue fused with the posterior surface of the iris. The iris shows fibrosis and is moderately infiltrated with lymphocytes and plasma cells. It blocks the filtration angle below.

The tissue occupying most of the interior of the globe is of chronic inflammatory origin. It is diffusely infiltrated with chronic inflammatory cells, and contains numerous small and large foci of epithelioid cells among which there are many Langhans giant cells. The infiltrating cells are chiefly lymphocytes and plasma cells—eosinophiles are notably

scanty. Cells containing blood pigment are abundant. Blood vessels are few in number and small in size. Many of the older arteries show endarteritis. This tissue in addition contains many areas composed almost exclusively of pus cells—small abscesses. The smallest of these are microscopic in size, the largest encountered measures *2mm* in diameter. Surrounding each abscess are occasional giant cells and numerous endothelial phagocytes containing cell debris, and each abscess is walled off by granulation tissue. Many of the pus cells are necrotic,—in a few of the abscesses they are completely necrotic and produce an appearance not unlike that of the caseation of tuberculosis. Here and there are foci composed chiefly of endothelial phagocytes filled with fat vacuoles. These, no doubt, represent abscesses which are undergoing resolution. Some of them show spaces left by cholesterin crystals. The whole tissue is pervaded by fibrous tissue which in places is especially dense. The small space representing the original vitreous chamber is filled with blood and fibrin containing a few chronic inflammatory cells.

The retina and choroid have been almost completely destroyed by the inflammatory process. Near the optic disc the retina is best preserved, and it can still be recognized bordering the small vitreous chamber. It is evident from the appearances at the optic nerve entrance and at the posterior part of the ciliary body that the inflammatory tissue arose chiefly within the choroid. The suprachoroidea has been replaced by a thick dense layer of fibrous tissue closely resembling sclera. This contains here and there minute foci of epithelioid cells. The ciliary body has not been pervaded by the new tissue but shows simply edema and moderate infiltration with chronic inflammatory cells. From its surface, however, there arises a dense cyclitic membrane which is continuous with the other inflammatory tissue within the globe.

The sclera is thickened and shows chronic inflammatory reaction similar to that seen in early phthisis bulbi. A few small foci of epithelioid cells are seen along its perforating nerves and vessels.

The optic disc and contiguous retina are densely infiltrated with chronic inflammatory cells but the nerve stem shows relatively slight reaction.

LEFT EYE.

Macroscopical.—(Fig. 2.) The globe measures 25*mm* anteroposteriorly and 24*mm* horizontally. The cornea appears normal. The anterior chamber is 4*mm* deep. The pupil is 4*mm* in diameter. The lens is in situ. The choroid and retina are not recognizable as such, but are replaced by a layer of new tissue adherent to the sclera. This layer is thickest posterior to the equator where it reaches a thickness of 4*mm*. Anteriorly it does not extend into the ciliary body but continues over the surface of the latter into a dense cyclitic membrane.

Microscopical.—The cornea is normal except for slight vascularization near the limbus. Adherent to the posterior surface are numerous large clumps of cells consisting of large mononuclear cells admixed with a few small lymphocytes. Many of the large mononuclear cells are pigmented. As many as eight of these clumps may be found in one section. At the sites of some of the clumps the endothelium is destroyed. The anterior chamber is filled chiefly with serum, but over the surface of the iris and filling the angle below is a small amount of blood. The serum is almost free from cells, but the blood contains many lymphocytes and a few pigmented large mononuclear cells. There is peripheral anterior synechia for about 1*mm* all around. The surface of the iris is coated with a thick fibrous membrane which continues as a thinner vascularized membrane over the surface of the lens, completely blocking the pupil. On the surface of this membrane there are clumps of cells similar to those on the back of the cornea. The iris is markedly infiltrated with lymphocytes and plasma cells and is firmly fused to the lens by a layer of young connective tissue, rich in cells, extending from the cyclitic membrane.

The ciliary body is highly edematous and is retracted from the sclera all around, the subchoroidal space here being filled with serum. It shows only slight cellular infiltration except beneath its surface where it is considerably infiltrated with lymphocytes. From its surface there arises a thick dense fibrous cyclitic membrane which sends a thin layer over the posterior surface of the lens. Posteriorly it continues over the pars optica retinæ.

The choroid is entirely replaced by chronic inflammatory tissue which is fused with the sclera. This tissue consists of poorly vascularized granulation tissue, densely infiltrated with lymphocytes and plasma cells and containing numerous small and large areas of epithelioid cells. The latter areas often contain Langhans giant cells, (Fig. 6). The tissue also contains abscesses similar to those of the right eye. In most sections these are small and few in number, but in some sections a number of large abscesses are present, near together, one 3*mm* in diameter, about 7*mm* from the optic disc (Fig. 3). In some of the smaller abscesses the pus has undergone complete necrosis. Foci consisting exclusively of fatty endothelial cells are not seen, but some of the abscesses are being extensively invaded by endothelial phagocytes. Many of the arteries within the choroid show obliterative endarteritis.

The retina is not separated, but is fused with the choroid, the pigment epithelium being completely destroyed. It is markedly infiltrated and greatly disorganized, but to a far less extent than the choroid. The lens shows the characteristic picture of a lamellar cataract and, in addition, marked cataractous changes in the posterior cortex evidently secondary to the inflammatory condition. The vitreous is infiltrated with serum and a moderate amount of blood. Strands of cells and tissue can be seen extending into it from the cyclitic membrane and from the retina, and it contains clumps of round cells similar to those on the back of the cornea. The optic disc is swollen but is only moderately infiltrated, and the optic nerve within the scleral canal is almost free from infiltration. The sclera and episclera show only moderate inflammatory reaction.

EXAMINATION FOR MICROÖRGANISMS.

By special staining numerous peculiar bodies are found in both eyes within the abscesses, but not elsewhere. In sections stained in hematoxylin and eosin, the bodies take the eosin stain, but so indistinctly that on superficial examination they might easily be overlooked or mistaken for agglutinated red blood corpuscles. They do not stain by the carbol-fuchsin method for tubercle bacilli, or in carbol-thionin. They

also fail to stain in Scharlach R. In unstained sections, examined in water, the bodies do not appear refractile. They are brought out well, after Zenker's fixation, by Verhoeff's Modified Gram Stain if the process of differentiation is not carried too far, but they are most easily demonstrated by staining sections 24 hours in Mallory's phosphotungstic acid hematoxylin. After Zenker's fixation the sections are first treated with a saturated solution of potassium permanganate for one minute and then decolorized in a 7% solution of oxalic acid before staining in the hematoxylin solution.

As seen in sections stained in phosphotungstic acid hematoxylin (Figs. 4 and 5) the bodies differ considerably in size, the smallest being about .01*mm* in diameter and the largest .06*mm*. In the larger abscesses as many as 40 bodies may often be seen in the low power field. In the smallest abscesses only one or two may be found, while in the completely necrotic abscesses no such bodies are usually recognizable. In general the bodies all show a similar structure, but yet differ somewhat in appearance, apparently according to their ages and according to the positions of their axes relative to the plane of the sections. Each seems to consist of a central stem with bulbous swellings which gives off short club-like processes (Fig. 5, a and b). Not infrequently the clubs give the appearance of a perfect rosette, probably due to the stem being seen end on (Fig. 5, e). From the stem there also arise delicate filament like processes which stain more faintly than the clubs and are sometimes barely visible. They may be abundant, scanty or entirely absent. The stem as a rule is difficult to recognize owing to its being masked by the processes. In some of the larger bodies it is branched, and the branches give off the same sort of processes as the main stem.

Many of the bodies show marked degenerative changes. These are best seen in the right eye within the abscesses containing large numbers of fatty endothelial cells. The process of degeneration seems to be as follows: The body becomes surrounded by endothelial phagocytes which fuse and form a layer of protoplasm around it. Sometimes it becomes enclosed in a typical Langhans giant cell. The clubs and processes gradually lose their stainable properties and also become broken up. Finally there is left only a sharply de-

fined deeply stained mass surrounded by a rim of protoplasm. As a rule the mass remains irregular in shape, but occasionally it becomes ovoid and the rim of protoplasm very narrow and free from nuclei. In such encysted forms on close examination the rim of protoplasm usually shows fine radial striations (Fig. 5, d).

The modified Gram method after formalin fixation, as employed for demonstrating the leptothrix of Parinaud's conjunctivitis, stains the stems of the bodies deeply but diffusely, and generally fails to stain the processes. It brings out the encysted forms well. After Zenker's fixation if the differentiation has not been carried too far it stains many of the bodies completely. After neither method of fixation does it reveal any filaments, either within the bodies or free in the tissues, such as are seen in the typical granules of actinomycosis. The fine filaments running out from the bodies differ from the filaments of actinomycosis in that the former are really processes of the bodies.

Summary of Case Report.—A poorly nourished but otherwise apparently healthy woman aged 30 (afterwards discovered to be pregnant) was operated upon for congenital cataract in the right eye. There was some loss of vitreous and the wound did not heal smoothly. The eye continued moderately inflamed and about 6 weeks after the operation the other eye became slightly involved. Later both eyes showed blocked pupils and marked Descemetitis, and the condition was regarded as sympathetic uveitis. One year after the operation on the right eye both eyes were removed for the relief of pain. A thorough general physical examination made shortly after this with special reference to the possibility of systemic actinomycosis gave negative results.

The pathological examination showed essentially the same process in each eye, namely, massive chronic inflammatory involvement of the choroid with advanced secondary iridocyclitis. The inflammatory tissue contained abscesses in various stages of necrosis and resolution and numerous foci of epithelioid cells containing giant cells. In places the typical histological picture of sympathetic choroiditis was produced. The process was much further advanced in the right eye which was somewhat shrunken owing to the extensive formation of

fibrous tissue. Within the abscesses in each eye, there were found after special staining numerous peculiar bodies resembling actinomycetes yet differing from the latter in certain respects.

The question arises as to the nature of the bodies in the abscesses. They are certainly not artefacts because they are frequently surrounded by endothelial cells and enclosed in Langhans giant cells. Owing to the extensive fatty degeneration within the tissues the idea suggested itself that they might be crystalline substances, possibly of a lipoid nature. This seems impossible, however, on account of their staining reactions and morphology. Moreover, still more marked degenerative changes frequently occur in eyes which have been removed on account of old iridocyclitis or other inflammatory conditions, but in such eyes I have never seen bodies of this kind. The only conclusion possible, therefore, seems to be that the bodies are microörganisms, and judging by their morphology, fungi.

The microörganisms strongly resemble actinomycetes in that they have formed clubs identical in shape and staining relations with those of the latter fungi. In fact, I have found no other types of microörganisms except actinomycetes that will stain in phosphotungstic acid hematoxylin. Moreover, the lesions they produced are indistinguishable from those of actinomycosis. The microörganisms differ however in two important respects from typical actinomycetes. In the first place the largest of the bodies are very much smaller and more irregular in shape than the large spherical granules usually seen in actinomycosis, and in the second place no typical streptothrix filaments are present either within the bodies or in the tissues. Owing to the long duration of the inflammatory process it is possible that large granules and filaments may have been present in the early stages and disappeared, although it seems unlikely that such resistant structures as the large granules could have entirely disappeared without leaving a trace.

The microörganisms evidently gained access to the right eye through the wound of the cataract operation and were later carried to the choroid of the other eye through the blood. Since even in the right eye the inflammatory process was also

chiefly in the choroid and since no demonstrable lesions developed in the lungs or elsewhere it would seem that the microorganisms had an affinity for uveal tissue.

It is generally believed that the characteristic clubs formed by actinomyces in the tissue result from direct transformation of the terminations of streptothrix filaments. The present case seems to show conclusively that a microörganism similar to, if not identical with, actinomyces can form clubs in the absence of streptothrix filaments, in other words, that the clubs may represent a special form of the organisms.

In the literature I have been able to find only two cases of intraocular actinomycosis, and in neither of these were both eyes affected. One, reported by Müller[1], was a case of multiple actinomycotic abscesses in the internal organs, in which there was found a small nodule in the retina of one eye. No organisms, however, were demonstrated in the retinal lesion. This was a case of generalized actinomycosis and is therefore in no way analogous to my case The other case, reported by Fuchs[2] was similar to my case in the histological character of the lesion, in the appearance of the fungi, and in the fact that the infection followed a cataract extraction. In Fuchs' case the chief lesion was within the ciliary body below, in which there was a large necrotic abscess surrounded by chronic inflammatory cells, chiefly epithelioid cells. From the ciliary body the process extended into the sclera and continued within the latter in ring form almost around the globe. Within the abscess Fuchs found a few small granules staining in hematoxylin, with processes resembling the clubs of actinomyces, and therefore assumed the case to be one of actinomycosis. He found no filaments and no large spherical granules. The Gram stain was not employed, however. Professor Fuchs kindly sent me two of the few sections he had remaining from this case, one of which contained three of the granules. A portion of the other section I restained by my modified Gram method, and another portion with phosphotungstic acid hematoxylin, but was unable to

[1] L. Müller. "Ueber Veränderung im Augenhintergrunde bei Miliarer Aktinomykose." *Klin. Monatsbl. f. Augenheilk.*, 1903, 41, 1, p. 236.

[2] E. Fuchs. "Ein Fall intraokulare Aktinomykose." *Arch. f. Ophth.*, 1919, 101, 1, p. 24.

find any additional organisms. It is noteworthy, however, that just as in my case, I was unable to find any filaments by the Gram stain. In the section stained in alum hematoxylin, the granules appeared entirely similar to many of those seen in my case. In my case the organisms did not stain in alum hematoxylin but this may be due to the different methods of fixation employed. Sections of typical actinomycosis stained in hematoxylin and eosin after formalin fixation, which I have at hand, show the central portions of the granules stained diffusely in hematoxylin while the peripheries, including the clubs, are stained in eosin.

In my case the process involved chiefly the choroid, whereas in Fuchs' case it involved chiefly the ciliary body and was far less extensive than in mine. It is interesting, however, that in both cases the fungi seemed to have special affinity for uveal tissue.

Fuchs assumed that in his case the infective material introduced at the time of operation settled to the bottom of the anterior chamber and reached the ciliary body through a break in its attachment by way of the subchoroidal space. It is not necessary, however, to assume such a break, as I have shown that tubercle bacilli can reach the subchoroidal space through an intact filtration angle.[3] This explanation seems applicable also to the infection of the right eye in my case.

As regards the source of the infection, Fuchs calls attention to the fact that various observers have described concretions in the lacrimal canaliculus made by actinomycetes thus proving that exceptionally such organisms must occur in the conjunctival sac. Judging by my own observation, such concretions are similar to those occurring in the crypts of the tonsils and always consist chiefly of filaments. I have never seen within them small "granules" entirely free from filaments such as occurred in Fuchs' case and mine. Nevertheless, it seems possible that streptotriches growing within the different environment of the ocular tissues might assume these non-filamentous forms.

Not only the clinical but also the histological findings in my case showed strong resemblance to those in cases of sym-

[3] Verhoeff. "The experimental production of sclero-keratitis and chronic intraocular tuberculosis." *Archives of Ophth.*, 1913, 42, p. 471.

pathetic choroiditis. Just as in the latter disease, the essential lesions were practically confined to the uvea in both eyes, and in places the lesions were indistinguishable from those of sympathetic choroiditis. On the other hand, the inflammatory process differed essentially from that of sympathetic disease in the production of abscesses and in its far greater intensity. Another important difference lay in the fact that it was more extensive and evidently of longer duration in the exciting eye than in the sympathizing eye, whereas in sympathetic disease the characteristic process begins at the same time and, in general, at any given time is of about the same severity in both eyes.

Nevertheless, it seems to me that this case brings strong support to the theory that sympathetic uveitis is infectious in origin, for it shows that microörganisms exist which possess or acquire an affinity for uveal tissue, and can metastasize through the blood from the uveal tissue of one eye to that of the other without producing demonstrable lesions elsewhere in the body. In fact, it does not seem impossible that sympathetic uveitis may be due to microörganisms similar to, although not identical with, those found in this case. For while by the same staining methods I have failed to find any definite microörganisms in the lesions of sympathetic uveitis, I was able to find them in this case only in the abscesses and never in the foci of epithelioid cells such as occur in sympathetic disease. Since it seems unlikely, if not impossible, that such an extensive formation of these foci of epithelioid cells could have been produced by toxins alone, it is reasonable to suppose that microörganisms, in some form not now recognizable, were present within them, and that similar microörganisms may likewise be present in the lesions of sympathetic uveitis. This seems all the more probable when the well known pleomorphism of the streptothrix group of microörganisms is taken into consideration.

Perhaps the most remarkable fact connected with sympathetic disease is that when the characteristic lesions are present in one eye no matter how insignificant in size they may be, the other eye is sure to be affected, in fact, is already involved. In other words, both eyes are always simultaneously involved. This fact is so conspicuous that it has distracted attention from

another fact, equally as noteworthy, namely, that in many if not most cases of chronic intraocular infections the second eye is involved far more frequently than can be accounted for by mere chance. Thus it is a matter of common observation that the frequency with which the second eye is sooner or later involved in cases of rheumatic iritis, syphilitic iritis, serous uveitis, syphilitic choroiditis, hereditary syphilitic keratitis, and chronic ocular tuberculosis, is out of all proportion to the general incidence of these diseases. Moreover, the disease generally involves the same structures in the second eye as in the first. These facts become still more conspicuous when it is recalled that in acute systemic infections with pyogenic cocci ocular metastases relatively seldom occur and that pyogenic infections of one eye after injury or operation practically never give rise to metastatic involvement of the other eye. The explanation of the frequency of bilateral involvement in various diseases of the eyes may be the same as that usually invoked in the case of sympathetic uveitis, namely, that the microörganisms have or acquire especial affinity for the ocular tissues involved.

It seems to me, however, that two other explanations are possible, which may also be applicable to sympathetic uveitis. One is that in certain individuals the ocular tissues concerned are especially susceptible to infection by the microörganisms in question. According to this theory the frequency of sympathetic uveitis would not be dependent chiefly on the prevalence of the assumed specific germs, as in the older theory, but upon the proportion of individuals having uveal tissue which is susceptible to these germs. The other possible explanation is that the infection of an ocular tissue may cause the individual to become more or less hypersensitive both to the tissue and to the germs. As a result of this when germs of the same kind happen at any time, even years later, to reach the corresponding tissue of one or the other eye, and produce a slight lesion, the latter instead of healing as would ordinarily be the case, causes a localized anaphylactic reaction, which, like any tissue injury, is favorable to the growth of the germs and thus to extension of the inflammatory process.

All of the assumptions in this latter theory are based upon known facts and it therefore seems to be worthy of considera-

tion. As applied to sympathetic uveitis it combines the germ theory and the anaphylactic theory of this disease. Obviously it is also applicable to infections of tissues other than those of the eye.

As applied to chronic ocular tuberculosis and hereditary syphilitic keratitis, and possibly also to some other chronic ocular infections, this theory may require modification or amplification. Thus in these conditions it is almost certain that the ocular infection is not due to recent systemic infection, but to microörganisms which have remained dormant somewhere in the body for a long period of time and then taken on renewed activity. As I have suggested elsewhere, it is possible that a relative mutual tolerance has been established between the microörganisms and the tissues and that ocular lesions occur only when the resistance of the patient becomes depressed and microörganisms are set free into the blood.

SYPHILOMA AND SYPHILITIC IRIDOCYCLITIS.[1]

By Dr. T. M. LI, Peking, China.

(With three illustrations in color on Text-Plate XXIV.)

THE majority of the reported cases of syphiloma of the uvea occurred prior to the discovery of salvarsan when syphilis was not as effectively treated as it is today. During the last decade only a few cases have been reported.[2]

In a country like China, where scientific medicine is practised only in limited areas, people with syphiloma of the uvea are undoubtedly numerous. Unfortunately only a few of them avail themselves of the opportunity given by the various hospitals for an early treatment of their disease.

This case of syphiloma is reported for three reasons: First, because it is an early case, being only three weeks in duration; secondly, because some of its histological details are of interest; and thirdly, because we believe that by the study of this case, we can explain some other unusual cases of syphilitic lesions of the eye which are met with in China.

Case.—L. W. C., a rickshaw coolie, 43 years of age, was admitted to the Peking Union Medical College Hospital,

[1] From the Department of Ophthalmology of the Peking Union Medical College.

[2] The most recent case was reported in 1922 by Hochwelker (7) but no pathological examination was made. Three other cases are recorded in the Ophthalmic Year Book. They were reported by Piccillo (4), Willet (5) and Mine (6). The literature of these cases is not at present available for study. Previous to 1912 the reports were more numerous, notably those of Parsons (1), Kipp and Alt (2), and Rollet (3) in which pathological reports were included.

We regret that we have been unable to procure E. Igersheimer's compilation of *Syphilis und Auge* for further reference.

September 26, 1923. Patient complained of poor vision in O. D. and severe headache.

History.—Patient complains of excessive lacrimation, severe headache, and a gradual impairment of vision since the onset of the disease. Duration 3 weeks. Disease began with inflammation and marked redness of the eye. The lids are swollen but there is no purulent discharge from the eye. Previous to the onset, the vision is said to have been the same as that of O.S. Patient had a chancre with buboes, accompanied by a rash, five years ago and received no treatment for it. Patient claims to have been reinfected five months before admission; no gonorrhea.

Examination.—O.D. ptosis. Marked congestion; no mucus or pus; no chemosis; marked ciliary injection. Cornea clear but pupil is not seen on account of the presence of a whitish mass occupying three fourths of the anterior chamber. Tension of O. D. is slightly higher than that of O.S. (finger). V.O.D. = light perception *20cm*, projection poor. V.O.S. = $\frac{6}{6}$.

The following day the patient was seen by Professor A. Fuchs who, because of the poor light perception (*20cm*), suspected a syphiloma of the ciliary body and iris, obscured by a hypopyon, with probably marked changes in the posterior portion of the eye. Enucleation was advised and the eye was taken out the next day. Wassermann, positive (++).

PATHOLOGICAL EXAMINATION.

Vertical crossed section was made. A temporal segment was removed and serial sections were made. The temporal segment was sectioned horizontally.

Inspection.—The anterior chamber is filled with a white mass. The periphery of the iris is pressed backward. The retina is not detached. The vitreous appears as a whitish mass which is slightly grayish as compared with the color of the mass in the anterior chamber.

MICROSCOPIC EXAMINATION.

Cornea.—The superficial layers of the corneal epithelium are intact but the deeper layers are much rarefied and the nuclei are very poorly stained, probably an artefact. The Bowman's membrane at the apex of the cornea is very much attenuated and in some places it seems to be absent (maculæ corneæ). The substantia propria, on the whole, is normal, but the superficial layers are loose and the corneal

ILLUSTRATING DR. T. M. LI'S ARTICLE ON, "SYPHILOMA AND SYPHILITIC IRIDOCYCLITIS."

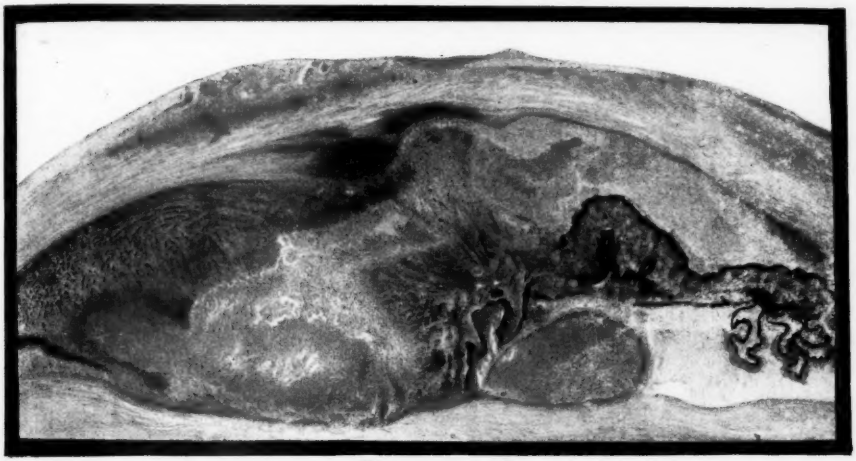

FIG. 1. × 12½

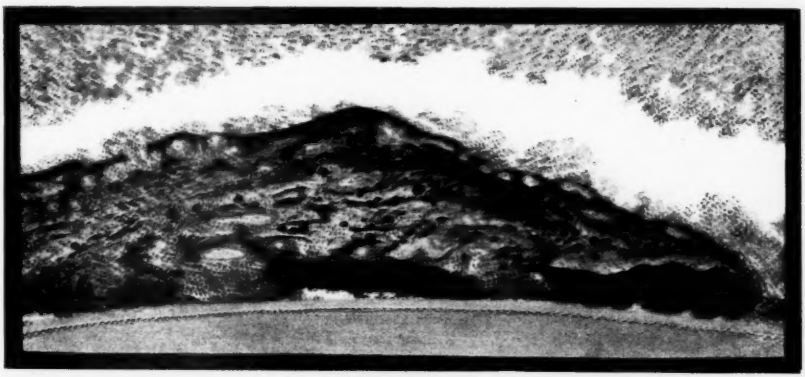

FIG. 2. × 77

FIG. 3. × 125

corpuscles are few in number. The Descemet's membrane is intact. The endothelium is mostly destroyed.

Anterior Chamber and Filtration Angle.—The greater part of the anterior chamber is filled by an exudate which is composed of necrotic polynuclear cells and a great number of phagocytes. The phagocytes are especially found around the exudate, on the posterior surface of the cornea, in the filtration angle, and on the surface of the iris. The periphery of the anterior chamber is comparatively deep. Schlemm's canal is nearly everywhere open.

Iris and Ciliary Body.—At the inner and upper quadrant, the corona ciliaris and a large part of the iris are replaced by a large focus of granulation and exudate (Fig. 1). The muscle here is totally destroyed. A few ciliary processes are lying on the lens, being pushed there by the tumor-shaped mass of granulation tissue and exudate. The latter originated apparently between the processes and the muscle, and produced a kind of dialysis. The center of the mass is composed of necrotic exudate, especially leucocytes, in which an enormous number of phagocytes is seen. The necrotic center is surrounded by a dense area of granulation tissue with new-formed vessels, many lymphocytes, plasma cells, and giant cells. Granulation tissue is wanting on the posterior surface of the mass where the necrotic exudate is in direct contact with the hyaloid membrane. The tumor-shaped mass projects into the anterior chamber and lies against the posterior surface of the periphery of the cornea. It extends also between the iris and the lens.

The pars plana, beside the mass, is densely infiltrated with plasma cells and lymphocytes; its epithelium is enlarged in size and is infiltrated with lymphocytes and polynuclear cells. Only a few hydropic cells are found in the adjacent vitreous. The sclera over the mass is infiltrated and attenuated, especially in the area occupied by the anterior ciliary vessels. The episclera here is enormously thickened due to round cell infiltration.

The iris is darkly pigmented (Chinese eye). Its root is destroyed and is replaced by cells from the lesion. On one side of the mass some remnants of the iris are seen folded over the lens, partly because the iris is pushed aside by the growth (iridodialysis) and partly on account of the presence of a thin membrane behind the iris (traction).

The iris is densely infiltrated with leucocytes, lymphocytes, and plasma cells. It is covered by a thin layer of exudate in which many phagocytes and some fibroblasts are found.

Apart from the general infiltration, we find *nodules* in the neighborhood of the mass and also on the side opposite to

the mass. As a rule, these nodules are very small and lie in the posterior layers of the iris (Fig. 2). They are especially found at the root of the iris and near its pupillary margin. These nodules are composed mainly of epithelioid cells and some lymphocytes. The former are often filled with pigment. The nodules have a tendency to destroy the pigment epithelium—without doubt many of the epithelioid cells here originated from the pigment cells—and grew into the posterior chamber against the lens. The pupil is covered by a thin membrane in which large vessels are found. In spite o the presence of a large number of connective tissue fibers there is no traction on the pupillary margin.

The periphery of the anterior chamber is very deep but there is no total adhesion between the posterior surface of the iris and the lens. The periphery of the iris was probably pushed backward by an increase of tension in the anterior chamber (see history).

The ciliary body away from the mass is practically not inflamed. It is only slightly detached by an albuminous fluid. The pectinate ligament and the root of the iris, on the contrary, are everywhere densely filled with round cells.

Lens.—The lens is normal and it is interesting to note that the capsular epithelium does not show any proliferation.

Choroid.—Apart from some insignificant accumulation of round cells in the choroid there is one important focus just temporal to the immediate vicinity of the entrance of the optic nerve (Fig. 3). This focus is composed of a number of lymphocytes and plasma cells and pushes the lamina vitrea slightly inward without destroying it. The pigment epithelium is wanting here. The diameter of this defect is 0.53*mm* which is about $\frac{1}{3}$ the entire extent of the focus. The pigment epithelium begins more or less sharply at the side of the focus. In the defect, there is lying between the lamina vitrea and retina a great number of lymphocytes and cells which remind us of endothelial cells. The retina over the focus is not specially inflamed but the rods and cones are here either destroyed or transformed into plump pear-shaped bodies. There is an albuminous fluid separating the retina from the choroid. The detachment is annular and slit-like. It surrounds the optic disc. The exudate is apparently derived from the choroid but the focus in the choroid itself contains no albuminous fluid.

Retina.—In the retina, there is marked periphlebitis and periarteritis. The walls of the vessels are infiltrated with lymphocytes. A small number of lymphocytes is also seen in the nerve fibre layer and a few hydropic cells are lying on the surface of the retina.

Optic Nerve.—The disc is slightly swollen. Apart from

the presence of periphlebitis there are no other important changes. Sections stained with Weigert's method do not show any loss of the medullated sheaths.

REMARKS.

In this eye an inflammatory process occurred which destroyed a part of the ciliary body. The histological study of the focus leads to a diagnosis of a syphilitic lesion. We have the granulation tissue in the periphery of the lesion and its center is formed by a detritus of cells. This anatomical diagnosis is further supported by the positive blood examination.

In the cases published by Kipp and Alt (2), Rollet (3), Parsons (1) and A. Fuchs (8), and according to the illustrations accompanying the reports of the last two authors, there was a histolytic destruction of the sclera. In our case the focus was not old enough to produce a perforation of the sclera but we see the manner by which the inflammation affected the sclera. We find that the sclera is inflamed on both the inner and outer aspects of the eyeball and that there are some files of polynuclear cells infiltrating between the lamellæ, but, there is no necrosis of the tissue. In the ciliary body, a part of the pigment epithelium and the muscle had disappeared and the processes were mostly pushed to one side (Fig. 1).

Apparently, the toxins in this case were not virulent. We recognize this fact by the behavior of the capsular epithelium of the lens which does not show any sign of proliferation. Likewise the retina is also only slightly irritated. What is remarkable is that the vitreous body is almost free from cells. In spite of the presence of the mass of exudate (Fig. 1) in the immediate vicinity of the vitreous we see no vitreous abscess and no other histological findings which will give rise to vitreous opacities clinically. We have here an explanation why in some treated cases of syphilitic papules of the iris, the eventual visual effect is good in spite of the fact that the iris is partially destroyed and the anterior chamber has been filled with pus. The cells in such cases seem to have no tendency to migrate into the vitreous cavity and, as a rule, the lens does not seem to be affected. On the other hand, in cases of purulent iritis due to a corneal ulcer, complicated cataract is of a common occurrence.

A special feature of this case of syphiloma is the presence of nodules of epithelioid cells and lymphocytes. These nodules spread out over the uvea and are independent of the syphiloma. These nodules are specially found in the posterior layers of the iris, moreover, they have the tendency to break through the pigment epithelium and to grow toward the lens (Fig. 2). Nodules with such a tendency of growth are rather unusual and we do not find them, as a rule, in cases of iritis of either tuberculous or syphilitic origin. In syphilitic cases, the nodules usually grow toward the anterior chamber. Their nodules are, as a rule, reddish and larger in size and are well known as the papulæ of the iris. In tuberculous cases the nodules are small and grayish. They are often visible with a corneal microscope. They become detached somewhat and float in the anterior chamber, forming the so-called fatty deposits on the posterior surface of the cornea.

Nodules which grow backward and perforate the pigment epithelium of the iris are commonly found in anatomical sections of sympathetic ophthalmia.

It seems that this kind of syphilitic nodular formation in cases of syphilitic iritis is fairly common here in China. It is remarkable that we very often see cases of iritis in which there is a positive Wassermann reaction but the clinical picture is not at all characteristic of syphilis. As these cases often show relapses and oftentimes appear like tuberculous iritis, we not infrequently have thought that they were perhaps not of a syphilitic origin, in spite of the positive Wassermann, because tuberculosis is also a very common disease in this country. We noticed that in some of these posterior synechiæ were formed also when the pupil was dilated, a condition we observe, as a rule, only in cases of sympathetic ophthalmia. This occurs when the nodules in the iris tend to grow backward. The present case of syphiloma explains the probability of the clinical cases quoted above as being syphilitic in spite of their non-characteristic appearance. We want to emphasize here that the nodules in the iris simulate the nodules of sympathetic ophthalmia both in their position and arrangement, but not their histological structure.

The choroiditis in this case (Fig. 3) is especially to be mentioned. Cells and fibrinous exudate are poured out into the

subretinal space. Such an internal exudation we do not see, as a rule, in cases of spontaneous infiltration of the choroid. Only in cases of endophthalmitis septica, especially when the retina is injured or necrotic, do we find an exudate in the subretinal space, due to an inflammation of the choroid. There is no solution of continuity of the lamina vitrea, therefore the lymphocytes had probably permeated through the lamina vitrea which is, as a rule, not permeable for polynuclear leucocytes. As the retina over this focus of choroiditis is not specially inflamed, there is no doubt that the focus originated primarily from the choroid. If such a subretinal exudation (choroiditis exudativa interna) becomes extensive, the clinical picture of Hippel's disease may very well be simulated.

It is difficult to explain why the light perception was so poor (*20cm*). It may be that the detachment of the retina by the fibrinous exudate has caused a kind of paralysis of the rods and cones, as over the choroiditic focus the rods and cones are destroyed. It is difficult also to state whether or not the condition in the retina and the light perception would be much improved had the patient received his salvarsan treatment earlier in the course of the disease.

The present case of syphiloma occurred in a patient who had acquired syphilis five years ago. This is remarkable because syphiloma occurs more often during the secondary stage than in the tertiary. In China we see the development of syphiloma, as a rule, from one to three years after the appearance of the initial sore. Clinically, it is interesting to note that such an extensive destruction of the ciliary body may occur without a greater involvement or perforation of the sclera.

This case of syphiloma may explain a remarkable case of intercalary staphyloma recently observed and treated in our hospital.

CASE.—The patient was a young married man of 22 who came to our clinic on January 18, 1924, for treatment of poor vision.

History.—Eight months ago patient's right eye became red with many white spots in the periphery of the cornea. The vision was much reduced but there was not much pain. The impairment of vision progressed and the eye became practically blind four months after the onset of the disease.

Thereafter the eyeball gradually protruded. Ten days ago the left eye became injected and the vision since then has been greatly reduced.

The patient was exposed, on several occasions, to venereal infection two years ago, but denied ever having had a sore or rash.

Examination.—O.D. Marked ciliary injection. Cornea is hazy with some superficial and deep vessels and bulges forward. Fully one third of the lower limbus and corneoscleral junction are ectatic. The ectatic cornea and sclera appear like a dark crescent below the cornea. Similar isolated ectatic areas are found at 11 and 3 o'clock respectively. There is a large mass of brownish deposit on the posterior surface of the cornea. The anterior chamber is very deep and shows broad peripheral synechiæ below, and a limited area at 8 and 4 o'clock. The structure of the iris is not sharply defined. The iris is covered by a new-formed vessel. There are no nodules or pigment spots visible. The pupil is relatively wide and a little irregular. Its margin is everywhere adherent to the lens with the exception of a small area, at the upper margin, which appears as a small black hole. The lens is covered by some pigment deposits.

O.S. Ciliary injection; cornea markedly dull. The infiltration is apparently in the deeper layers and is composed of a large number of minute spots. The anterior chamber is normal in depth. The periphery of the iris is apparently free. There are some small white peripheral opacities at the limbus. Short vessels are seen in the cornea, the position of which is difficult to ascertain. The pupil is fully dilated (atropine). The iris appears normal. No deposits are discovered.

V.O.D. = Hand movement 6 inches. V.O.S. = Count fingers 1 foot.

Tension: O.D. *27mm* Schiotz. O.S. *16mm*. Wassermann reaction positive (++++).

Tuberculin test negative.

An iridectomy was performed on the right eye and the tension was reduced.

The patient was referred to the syphilis clinic for treatment. At the time the patient was discharged, on February 27, 1924, the right eye could detect hand movement at 1 foot while the left eye had a vision of $\frac{6}{30}$. The general clinical appearance of O.D. was not improved, but the corneal opacities of O.S. were much clearer than before.

This was probably a case of syphiloma of the ciliary body with an extensive involvement of the corneosclera. The

marked intercalary staphyloma is not accompanied by any marked increase of the intraocular tension (*27mm* Schiotz).

It is safe to assume here that in this case the intercalary staphyloma was primarily caused by the lesion in the ciliary body which had produced an extensive destruction of the inner lamellæ of the corneosclera, while the slight rise of tension was due to an accumulation of fluid in the anterior chamber on account of the extensive peripheral synechiæ.

In conclusion the writer wishes to express his appreciation to Professor A. Fuchs for his kind suggestion and comment in the preparation of this report.

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THE LINDNER STRABISMUS OPERATION WITH TECHNIQUE AND ORIGINAL AND ADDITIONAL CASES REPORTED.

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(With three illustrations in the text.)

IN the science of medicine a multiplicity of therapeutic measures usually means general dissatisfaction with all of them. This same fact is true to a certain extent in the operative treatment of strabismus, especially the nonparalytic type. Almost every operating oculist has devised a different method for correcting his cases. Several of these have withstood the test of time, *i.e.*, the test of their post-operative results. Judging, however, from the honest opinion of many notable ophthalmologists, the operative treatment of strabismus is still far from satisfactory.

Here in the United States, advancements, resections, tuckings, and tenotomies, as well as various mechanical devices for holding the elusive muscle are discussed from all sides. Sooner or later the operative treatment of this must be more nearly standardized. It must be done and the standardization of the operative treatment of strabismus is not as wild a thought as one could think. Any recommendation for this at this time is not intended and would be irrelevant. Instead I am adding to the operative procedures already existent in this branch another technique through this report.

A proper assumption is that most cases of strabismus from a surgical standpoint are different only in the degree of deviation present, that is, in the amount of correction necessary.

A strabismus operation in the largest number of cases is, at the best, a pure cosmetic operation.[1] This is especially true when one considers an operation such as is being described. It is best fitted for the more severe degrees of heterotropia. The writer would not consider using it, it would be unwise, for the milder deviations. This same applies to the operative treatment of heterophoria. Controlled tenotomies and the tendon tucking operations are quite sufficient for these deviations. The simple or uncontrolled tenotomy should never be done. Late contralateral deviations are not uncommon after it.

The essentials of an ideal operation undoubtedly are as follows: one in which the technique is not difficult; in which the amount of advancement is under control at all times; in which the late disastrous results of unguarded tenotomies are prevented; in which the disfiguring lumps in the conjunctiva so common in extensive tuckings do not develop; and the most important, one in which the immediate result obtained at the operation remains as the permanent result.

The operation which I am about to describe was devised and worked out by Docent K. Lindner of the Allgemeines Krankenhaus, University of Vienna. (The writer in doing his cases has changed somewhat the manner in which the sutures are placed from that in the original operation, also making a change in the anæsthesia. The former may be an important point but the latter is not especially so.) To claim this operation as an ideal would be absurd for one reason alone, that is the small number of times it has been performed. It does, however, fulfill many of the demands in an ideal operation according to the requirements for such an operation as just stated.

The operation is decidedly valuable for strabismus of the severer grades, for paralytic strabismus as case 7, and for reoperations after contralateral deviations have occurred following earlier uncontrolled tenotomies as case 9. The operator can exert as much traction as is necessary to move the eye into parallelism with its mate by means of the two forceps upon the split stump, without putting undue strain upon the

[1] "Eine neue Art der Vorlagerung mit Muskelausschneidung." Dr. K. Lindner, *Ztschr. für Augenheilk.*, Berlin, Mar., 1924, vol. ii., No. 4, pps. 251–254.

sutures. The amount of correction desired is easily estimated. There are two fixed points in clear view of the operator, one upon the edge of the muscle where the suture is placed, and the other or second is upon the sclera anterior to the insertion of the muscle tendon. The distance between the two is the amount of movement in abduction or adduction which will be achieved when the forceps are approximated and the sutures tied. It is unnecessary to allow for muscle stretch, either from a pull upon the muscle or from relaxation of the tendon stump, or any other structure at the point of insertion of the fixing end of the suture. If the scleral sutures are properly placed they will not give way there. The split stump of the tendon gives two points for preventing an operative rotation of the eyeball in suturing the muscle to its new insertion, allows for the traction necessary to correct the deviation and assists in forming a thick, wide, new insertion. The sutures, as placed in the edge of the muscle according to the original as well as the writer's modification, will not slip out of position nor move longitudinally along the muscle and in this way split apart the fibers. As a matter of fact the more pull which is applied to the writer's knot in the muscle the tighter it will remain in place.

Undoubtedly the constriction of this knot causes the death of certain of the fibers contained within its loop for some of these sutures do come away after 10 to 14 days spontaneously and all are quite readily removed. They do hold long enough, however, for the scar tissue formed, assisted perhaps by the split stump beneath, to hold the muscle to its new insertion. The controlled tenotomy prevents a later contralateral deviation due to a posterior slipping or nonattachment of the cut end of the muscle. By means of the tenotomy suture the operator may allow as much tenotomy relaxation as he desires to assist and to augment the rotation required and largely obtained through the advancement. At the same time this tenotomy certainly gives some rest to the advanced muscle during the process of scar tissue attachment in its new position. This may be an important factor. It is the opinion of Lindner, some men to the contrary, especially Claud Worth of London, and this is concurred in by many other ophthalmologists, that an advancement alone is inadequate. It should be assisted in

every case by a tenotomy of its antagonist. The technique of this strabismus operation is no more difficult than that of any other. I have performed it many times upon the cadaver and several times upon the living without any difficulty. One point is worth noticing, if white silk is used for the sutures C and D, and black silk for the sutures A and B, the operation becomes quite simple. The last point in this description of it as a satisfactory operation are its end results. The illustrations

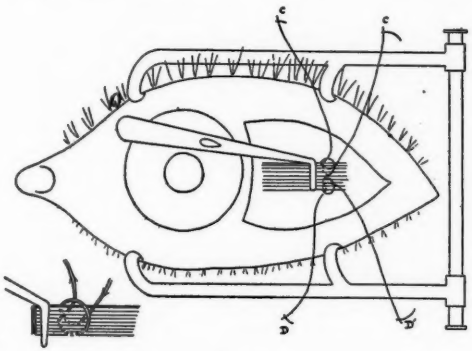

FIG. 1.
Drawing to show the manner of placing sutures.

here shown, as well as the observations made upon Lindner's and my own cases, help decidedly to demonstrate that the immediate result obtained at the operation remains practically as the permanent result. The knot in the muscle, the scleral insertion of the suture, the manner in which the eyeball is moved into its corrected position without pull upon the sutures, the controlled tenotomy, and the fourteen day binocular bandage all are factors and adjuncts in allowing this claim.

Lindner uses for his anæsthesia cocain injections 1% with epinephrin. I have changed mine to the use of holocain 2%, one drop every ten minutes for six drops before the operation, and at the operation an injection of 1% procain with the epinephrin. This injection was not necessary in two cases. The conjunctiva is first elevated with the injection and then the area of the muscle is deeply but sparingly injected as well. An injection of cocain or procain can be made at the outer canthus

subcutaneously to include both lids as is done in cataract work but this has no decided advantage.

A wide opening eye speculum, as illustrated, is best. The other instruments necessary are, strabismus scissors, blunt iris type scissors, muscle hooks, fine tissue forceps, ivory millimeter rule, sharp ring curette, muscle and fixation forceps with catch, needle holder, two white and two black silk double

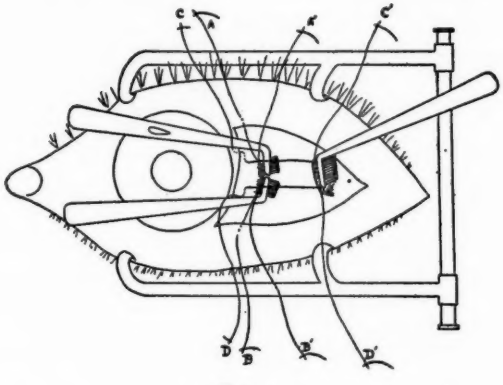

FIG. 2.

Drawing to show sutures ready for tieing.

armed sutures, two special needles (not used in the original operation), and one other black silk suture.

The technique in table form follows.

1. Injection.

2. Cut the conjunctiva crucial shaped with the horizontal arm longer than the vertical and well into the canthal angle.

3. Bare Tenon's capsule and nick the capsule above the edge of the muscle.

4. Expose the muscle and dissect it free with clean snips of the scissors as widely as is possible.

5. Place forceps upon the muscle at least 5*mm* back from its tendon insertion. This depends upon the amount of deviation present.

6. Place sutures C and D into the edge of the muscle, see illustration 1, each suture should include not quite one half of the width of the muscle. In its first passage into the muscle it

is to be placed more superficially than in its second, and as it leaves the muscle for the second time the needle is passed through the loop of the first turn to form the knot shown in insert of illustration. The first turn of this suture should include something less than the total thickness of the muscle, the second turn should pass entirely through the muscle.

7. Clean the sclera of all episcleral tissues with a sharp

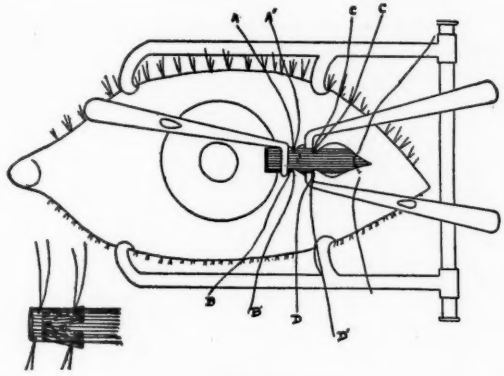

FIG. 3.

All sutures tried in the advancement stage of the operation.

curette, immediately anterior to the tendon insertion of the muscle.

8. Place sutures C and D into the cleaned sclera at the same horizontal levels as they lie in the muscle border, the needles enter close to the limbus and point vertically toward the upper and lower cul-de-sacs. The needle should be straight or only half curved at the most, short in its length and with a split eye. The point should be perfect and it should have a round non-cutting body. I have used a suggestion given by Worth which is valuable. Just before the needle is passed into the sclera it is brushed against a bit of sterile white vaseline. In passing this needle start with sufficient pressure to dimple the sclera, then change its direction by moving the eye portion of the needle posteriorly so that the needle will traverse at least one half of the thickness of the sclera and its point reappear upon the surface of the sclera no

more than *2mm* from its insertion. The needle can then be drawn through with its threaded silk after a new hold has been taken with the needleholder.

9. Cut the muscle leaving sufficient stump for the next step, then fold the cut end of the muscle away.

10. Split the stump into two equal portions.

11. Place the sutures A and B. The needle is passed first through the stump and then through the edge of the contiguous conjunctiva. These sutures can then be placed upon the forehead until later.

12. Place the stump forceps upon the stumps formed under all sutures.

13. Tie a single loose knot in the sutures C and D. These sutures before tieing must lie under the heel and the point of the forceps so that when the three forceps are approximated the cut end of the muscle will not be bunched in the knot formed.

14. Approximate the three forceps. The two upon the stumps are pulled in one direction while the one upon the muscle is pulled in the opposite direction so that the cut end of the muscle overlies the split stump. As they are held in this position,—

15. Tie the sutures C and D in a double knot and clip their ends.

16. Release the forceps upon the stump.

17. Place the sutures A and B through the edges of the overlying muscle, using at this time the other needle. These sutures are double armed also. Tie these sutures and clip their ends short.

18. Open both eyes and examine the case.

19. Inject the antagonist muscle.

20. Cut the conjunctiva over it crucial shaped as before.

21. Grasp the muscle belly with the fixation forceps without lifting the muscle upon the hook or without breaking through Tenon's capsule. This forceps remains upon the muscle until after it has been cut.

22. Place the controlling suture. This is of black silk and is passed first through the conjunctiva and then into the tendon of the muscle at its place of insertion. The suture is then looped around the forceps and the needle again passed through

the muscle. The forceps thus grasps the muscle between these two points. The needle is then drawn through the conjunctiva lying above this last position.

23. Cut the muscle between the insertion of the suture into the tendon and through the belly of the muscle. Release the forceps. No fibers of this muscle should remain uncut.

24. With a clean snip of the scissors cut the forceps free from the advanced muscle removing that tag of muscle which it is holding and which is now redundant.

25. Tie the tenotomy suture tightly or loosely, with the patient's eyes both open, depending upon the amount of antagonist release desired.

26. Places where the conjunctival edges do not come into exact apposition may be disregarded except that one black suture may be placed over the belly of the advanced muscle if desired. The white sutures will project through the conjunctival wound to allow their later removal.

27. A binocular dressing is applied for fourteen days. The dressing should be removed daily after the first twenty-four hours and the conjunctival cul-de-sacs and lid margins cleansed of the secretions which have collected there.

28. All sutures removed the fourteenth day.

CONCLUSIONS.

While this operation as stated before is not reported as the ideal operation, it still has much to offer in this field of surgery besides its newness. The results obtained have been quite satisfactory and are well worth my continued use of the operation. I am certain that it will stand well a trial by other ophthalmologists. The few changes made from the original operation and noted before probably do not in any way make the operation more valuable. They are purely individual, and for that reason are included herein.

Chart 1

A Number of case.
B Age of patient.
C Deviation present.
D Postoperative remarks.
E Length of time binocular bandage was worn.
F End result.

Cases above the double line are the original cases of Dr. Lindner as they were given to the writer, those below the double line are the writer's cases in continuation.

A	B	C	D	E	F
1	17	13°C.	Parallelism after 7 days. Later a divergence.	14	After 11 weeks 15° of divergence.
2	18	23° to 28° Converg.	Less than 8° divergence.	2	After 16 weeks 8° diverg. for near, 5 Div. for distance.
3	31	36°D.	After 14 days tenotomy of the antagonist.	14	After 16 weeks orthotropia for both near and distance.
4	23	15°C.		3	After 2 weeks 25° divergence; at that time all trace of patient was lost.
5	23	35°C.		5	After 4 weeks distance 2° converg., orthotropia for near.
6	20	35°C.	2° to 3° convergence.	7	After 18 weeks orthotropia for near and distance. Case had a nystagmus of from 15° to 25°.
7	15	40°C.		14	After 5 weeks orthotropia for near, distance 2° Conv.
8	20	20°D.	Tenotomy of antagonist 2 days after advancement.	14	After 5 weeks orthotropia for near, distance 5° Conv.
9	17	25°C.		14	After 7 months distance orthotropia, near 3° Conv.
10	14	20°C.		14	After 8 months distance orthotropia, near 3° to 6° convergence.
11	22	Over 50°C.		5	After 2 weeks distance and near orthotropia.
12	25	25°C.		7	After 2 weeks near orthotropia, distance 10° Conv.
13	17	25°C.		14	After 4 weeks distance and near orthotropia.
14	16	67°C.	Eyes parallel immediately after operation.	14	After 9 weeks distance and near orthotropia with the correction of glasses.
15	24	38°C.	Eyes parallel after operation.	14	After 6 weeks orthotropia for near, distance 2° Conv.
16	8	Over 40°C.	After 3rd dressing a periodic sudden and abrupt convergence movement was noticed. Tenotomy int. rectus, controlled, after 6 weeks repeated O. D.	14	One week after last operation and 8 weeks after first orthotropia for near and distance.
17	24	50°C.	Very slight divergence immediately after operation.	14	After 3 weeks orthotropia for near, 3° to 5° for distance convergent.

SYPHILITIC IRIDOCYCLITIS WITH A CONSIDERATION OF FACTORS INFLUENCING ITS OCCURRENCE.

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BY the introduction of arsphenamin and its derivatives, drugs which exert so much more profound an action on syphilitic infection than mercury, the clinical course of syphilis has unquestionably been affected. An accurate estimate of this influence can be determined only after a prolonged period of observation. That this influence may not be a favorable one, especially with the present control of venereal disease, is indicated by the reported high incidence of neurosyphilis in patients insufficiently treated with arsphenamin. In regard to ocular syphilis it has been stated that lesions of the optic nerve have increased in frequency while iridocyclitis is much less frequent (1).

The following is a study of 190 patients with syphilitic iridocyclitis observed chiefly at the Baltimore Eye, Ear, and Throat Charity Hospital and at the Presbyterian Eye, Ear, and Throat Charity Hospital. In each patient associated lesions of syphilis were noted, a blood Wassermann and whenever possible an examination of the cerebrospinal fluid was performed and an attempt was made to evaluate the influence of arsphenamin and mercury in producing or inhibiting lesions of the anterior uveal tract.

TIME OF OCCURRENCE OF IRITIS DURING THE COURSE OF SYPHILIS.

Statistical studies have shown that iritis occurs in the majority of cases during the first year of infection and is fre-

quently associated with secondary manifestations of the skin and mucous membranes.

Reference to Table I shows that in the combined statistics of Groenouw (2) and Talbot (3) of 506 iritides 349 or 69 percent occurred during the first year of infection. In the present series 108 or 56.8 percent of the 190 iritides occurred during the first year of infection.

TABLE I

PERIOD BETWEEN INFECTION AND THE OCCURRENCE OF IRITIS

	Groenouw	*Talbot*	*Zimmermann*
Up to 6 mos.	166	57	78
6–12 mos.	79	47	30
2 years	50	22	10
3 years			
4 years		14	11
5 years			
5–10 years	57	10	8
10–20 years		4	12
20+			1
			40 undeterminable

Of the 23 white patients in the present material who presented a generalized secondary eruption nine were of the macular type, ten maculopapular, three lenticular and one follicular pustular. Among the colored there were 62 with early syphilides, four macular, three maculopapular, six lenticular, forty follicular papular, seven follicular pustular, and two with other pustular types. Follicular syphilides, an unusual variety of secondary eruption in whites, is frequent among negroes. A common symptom complex in secondary syphilis in the negro consists of a follicular syphilide, severe nocturnal myalgia and arthalgia, a polyadenitis of such a degree that the superficial glands are visibly enlarged and iridocyclitis. In whites Jullien (4) noted the association of follicular types of syphilides and iritis.

Iritis is seldom associated with frank tertiary lesions. Von Schroeder (5) among 156 iritics found such an association only twice, Widder (6) in 46 iritics found secondary lesions in 37 and tertiary lesions in only one. Among the present acute iritides there were active tertiary lesions in three, one presented a diffuse aneurysm of the aorta, one a gumma of the

sternoclavicular articulation and one a gumma of the penis. In one other iritis had been preceded by a gummatous periostitis of the tibia.

FACTORS INFLUENCING THE PRODUCTION OF IRIDOCYCLITIS.

Three possible factors may be said to determine whether the anterior uveal tract shall be involved in syphilis, an individual predisposition, infection with a strain of spirochæta pallida having a selective action for the iris and ciliary body, and finally external or environmental conditions, especially treatment and trauma.

1. Individual predisposition to iritis is evident in an analysis of syphilis in the negro. A greater severity of uveal reactions, and a high incidence of iritis in the American negro has been emphasized (7), (8), (9), (10). Possibly of similar significance are Blatt's (11) observations on endemic syphilis in Bosnia where a characteristic lesion of infection consisted of a severe chorio-retinitis with marked changes in the retinal vessels frequently preceded by an iritis.

2. The possibility of strains predisposing to involvement of the uveal tract has been indicated by work in experimental syphilis. In rabbits inoculated with two strains isolated from neurosyphilitics and one strain whose characteristics were unknown, Reasoner (12) observed a high incidence of choroiditis and chorio-retinitis. On the other hand with fourteen strains obtained from initial lesions and moist papules such lesions were not observed in a single rabbit. Nichols and Hough (13) isolated a strain of spirochæta pallida from the spinal fluid of a neuroccurrence which seemed to possess the tendency to produce metastatic lesions involving cornea, eyelids and choroid.

Brown and Pearce (14) in their work on rabbit syphilis state that there is no doubt that the particular spirochæte concerned in certain infections may be regarded as a predisposing factor in the production of ocular lesions. Recently isolated strains of spirochætes tend to produce a considerable number of eye lesions, chiefly keratitis. There may even be distinct differences in the character and severity of the ocular reaction produced by organisms derived from various sources. How-

ever this tendency toward ocular involvement is not a fixed biological characteristic. With continued passage the incidence and severity of eye lesions may increase or diminish.

In human syphilis there is as yet no indication that strain plays a part in the production of uveal lesions. Escher (15) reports iritis in a husband, a wife, and in the latter's mother who was infected extragenitally. He reasonably interprets this unusual occurrence as a coincidence.

3. Of the external or environmental factors which may influence the occurrence of a syphilitic iridocyclitis, treatment is most important, especially since the introduction of arsphenamin which may inhibit the disease decisively and disturb the natural response to infection.

In rabbit syphilis produced by a constant strain of spirochæta pallida Brown and Pearce (16) found an appreciable connection between the experimental conditions employed and the resulting types of disease. Certain groups of tissues tended to become involved in a given order with iritis tending to occur toward the end of the cycle of tissue involvement. By diminishing or suppressing the primary reaction (excision of the initial lesion or therapeutic interference with arsphenamin or its derivatives) it was possible to modify the course of the disease by conferring protection to certain tissues so that protection failed to reach the eyes, lesions of the cornea and iris occurring as the only manifestations of a generalized infection. Circumstances which were unfavorable for the occurrence of other generalized lesions, tended to increase the relative incidence of lesions of the eyes, and conversely, conditions which were most favorable for the occurrence of other metastatic lesions tended to reduce the relative incidence of eye lesions.

In analogy to these significant phenomena in rabbit syphilis it might be expected that iridocyclitis would be a frequent symptom of recurrence in human syphilis following failure to abort the disease in the primary stage with arsphenamin. However such is not the case. Recurrence if it manifests itself early in such patients tends to occur in the form of a positive Wassermann reaction, as a neurorecurrence, or as a lesion of the skin or mucous membranes. While iritis does occur as a so-called iridorezidiv, biologically analogous to the neuro-

rezidiv, yet its occurrence is relatively unusual. In fact competent observers have expressed the opinion that since the introduction of arsphenamin iritis has become a much less frequent manifestation of syphilis than formerly.

THE RELATION OF TREATMENT TO THE PRODUCTION OF IRITIS; RELAPSES AND RECURRENCES; JARISCH-HERXHEIMER REACTIONS; IRIDOREZIDIVS.

It is apparent that only after a prolonged period of observation can the influence exerted by arsphenamin on such a chronic disease as syphilis be accurately determined.

In regard to iritis Krückmann, Buschke and Heller (1) believe its incidence has definitely decreased since the introduction of the arsenical antisyphilitics. Heller even states that its occurrence has become rare. Inasmuch as iritis is so frequently a manifestation of early secondary syphilis it is difficult to conceive how its incidence could be so strikingly reduced in a dispensary material. At the Baltimore Eye, Ear, and Throat Charity Hospital iridocyclitis comprised over 40 per cent. of all ocular lesions of acquired syphilis observed the past two years.

Fuchs (17) states that recurrences of syphilitic iritis are common. Groenouw (2) in 171 syphilitic iritides observed 28 or 16 per cent. of recurrences and considers this estimate as too low. Igersheimer (18) on the other hand is of the opinion that syphilitic iritis in contrast to tuberculous and "rheumatic" iritis rarely recurs after the process has been quiescent for a period of one year. In sixty iritides of syphilitic origin observed for one to two years and twenty over a longer period recurrences occurred in three.

In the 190 iritides of the present material there were 21 recurrences, 12 of which occurred after a quiescent period of more than one year. Fifteen of these recurred after arsphenamin, for the most part in patients who had received six or less doses of the drug.

Two cases of relapse are of special interest. Both occurred in patients who were first observed with early secondary syphilis and developed iritis shortly after the administration of a course of arsphenamin. (Iridorezidivs.)

The following summary will typify this relapsing form of uveitis.

T.P.	*38, Male, White*	*Wassermann*
1–12–20	Early secondary syphilis. Roseola.	Positive
1–14–20	to 2–19–20 Six injections of arsphenamin, 2.4*g*.	
4–20–20	O.S. Acute iritis, vitreous opacities.	Positive
4–27–20	to 5–19–20 Arsphenamin, four injections, 1.6*g*, prompt response to atropia and antisypnilitics.	
6– 4–20	Relapse of iridochoroiditis O.S.	Negative
6– 4–20	to 7–9–20 1.6*g* arsphenamin, four injections.	
8–10–20	Chroiditis both eyes. O.D. Vitreous so clouded fundus is obscured. O.S. Macular choroiditis, perivasculitis with exudate along superior temporal vessels.	Negative
8–10–20	to 11–10–20 Arsphenamin 5.2 grams, 13 injections.	
12–15–20	Vitreous in both eyes clouded. Following one dose of arsphenamin the media had cleared up enough to allow the fundus to be made out indistinctly. Patient again disappeared.	Negative
4–18–21	Relapse of iridochoroiditis O.S. 10 injections of arsphenamin 3.9*g* and three intravenous treatments of mercury.	Positive
8– 2–21	Relapse. Two doses of arsphenamin.	Negative
10–22–21	Relapse of iridochoroiditis. Prolonged course of arsphenamin, 14 injections, 5.2*g* and 10 doses of intravenous mercury. Finally six more doses of arsphenamin. During 1922 no further relapse.	Negative

Striking in this case is the tendency toward relapse of the uveal lesion and the immediate improvement in the ocular lesion each time arsphenamin was exhibited. Apparently arsphenamin cleared up the lesion promptly but failed to sterilize the focus of spirochætes. Analogous processes occur in syphilitic infection in other structures than the eye. One patient under observation returned with five distinct recurrences each time in the form of a chancre redux (positive dark-field examinations) in spite of the fact that some of the recurrences were preceded by as much as three grams of arsphenamin administered in a period of five weeks. Each time the chancre redux involuted under treatment to recur when treatment was neglected. Such phenomena need not indicate an arsenic fast strain of spirochæte, they may as well

depend upon unusual defense reactions in the infected individual.

HERXHEIMER REACTIONS AND IRIDOREZIDIVS.

Terlinck (19) in 1914 reported three cases of uveitis developing a few days after an injection of arsphenamin or mercury. One patient with a neurorecurrence (bilateral optic neuritis) developed an acute iritis three days after an injection of arsphenamin. A second had had previously two attacks of syphilitic iritis in the left eye and had been treated by the chronic intermittent method. During a course of enesol the iritis recurred after the third injection, after the fourth hyphæma and secondary glaucoma developed. The lesion cleared up promptly under arsphenamin. A third patient, asymptomatic except for a positive Wassermann, developed an iritis four days after an injection of mercury salicylate. In analogy to neurorezidivs the lesions were designated as iridorezidivs. Terlinck accounts for the early appearance of iritis (a few days after treatment) in contrast to the later onset of a neurorezidiv (weeks to several months) on an anatomic basis. In the meninges a focal reaction will require a longer interval to manifest itself clinically than one in the iris, in which an inflammatory process will at once become apparent.

It would seem more plausible to explain Terlinck's cases on a basis of stimulation of dormant foci of spirochetes, Jarisch-Herxheimer reactions. Neurorezidivs depend upon suppression of infection and defense mechanisms by therapeutic interference in primary or early secondary syphilis with a subsequent intense reaction at the site of foci of surviving spirochetes in the central nervous system. In such patients the blood Wassermann is often negative at the time of onset of the neurosyphilis. In the present series there was one case analogous to the reactions described by Terlinck.

A woman (patient of Dr. Harry Friedenwald), 58 years of age, presented an active chorio-retinitis in the right eye. The blood Wassermann showed complete fixation. She had been observed twenty-two years previously with a bilateral optic neuritis of syphilitic origin, which had responded to intensive mercurial treatment with a good functional result.

On the day following the second injection of neoarsphenamin (0.15 and 0.3 respectively) a violent iritis with hypopyon developed in the right eye. However following the third injection 0.6 the exudate underwent absorption and the iritis subsided rapidly. Probably the initial small doses of neoarsphenamin stimulated inactive foci of spirochetes in the anterior uveal tract and the resulting reaction was promptly inhibited by the subsequent larger dose.

An ocular Jarisch-Herxheimer, reaction observed by Igersheimer (20) is noteworthy in as much as it exemplifies as in the case just cited that the distribution of organisms in ocular tissues may be much more extensive than indicated by the gross eye lesion. A patient with a right iritis papulosa developed a marked papilloretinitis in the left apparently normal eye two days after an injection of salvarsan. Igersheimer interprets this reaction as indicating activation of spirochetes in a retina previously healthy, according to ophthalmoscopic appearances.

In general Jarisch-Herxheimer reactions involving the anterior uveal tract may occur (1) in an eye previously free from all clinical changes (Terlinck 19, Hensen 21). (2) in an old quiescent iritis (Terlinck 19. Toulant 22). (3) as an intensification of an already acute iritis (frequent).

In contrast to this one outspoken Jarisch-Herxheimer reaction in the present series, there were fifteen iritides which would allow an interpretation in the sense of an iridorezidiv, analogous to a neurorezidiv. Each patient was originally treated with arsphenamin for early secondary syphilis, iritis developed from 4 weeks to 14 weeks, usually 5 to 8 weeks after the last injection, an interval corresponding to that preceding the onset of neurorezidivs. In two patients there was actually an association of typical neurorezidiv and an acute iritis (Patients 5 and 8 in Table 2). In striking analogy to neurorezidivs the blood Wassermann was negative in seven, there was partial fixation in three and complete fixation in two.

The ocular reaction in these postarsphenamin lesions is often intense and extensive. Verhoeff (23) has reported a case of retino-choroiditis juxtapapillaris in which a detailed pathologic study was made. A colored male with a tonsillar

chancre received 0.6 *g* arsphenamin intravenously. Neglecting to return he developed two months after treatment a severe ocular reaction which failed to improve under renewal of antisyphilitics. Microscopic examination of the enucleated eye showed only minor changes in the anterior uveal tract, retinal detachment due to a granulomatous lesion near the disc involving chiefly the inner retinal layers and only secondarily involving the disc and choroid. The Wassermann reaction was negative.

In the same category belongs a case reported a gumma of the papilla by Kumagai (24). The ocular reaction occurred four or five months after the primary lesion and three months after an injection of arsphenamin. Matsukawa (25) observed a patient originally presenting an iritis papulosa following a few months after an initial lesion. One dose of arsphenamin resulted in rapid absorption of the papule. Two months later the ocular lesion recurred. Examination of the enucleated eye showed a syphiloma in each, the ciliary body and optic nerve.

Bahr (26) observed a "gumma" of the iris which developed five weeks after an injection of arsphenamin. Antonelli, Courtois-Suffit and Levy-Bing (27) report an associated iritis and optic neuritis in a patient who had previously received one dose of arsphenamin for early secondary syphilis.

In analyzing such lesions it is noteworthy that all these severe ocular reactions occurred in patients who had been insufficiently treated with arsphenamin for primary or early secondary syphilis. The analogy with intense meningitic reactions of neurorecurrences is evident. In each instance infection is suppressed at a time before certain as yet little understood protective mechanisms have developed. The spirochetes escaping the effects of the arsphenamin produce a marked exudative reaction which may be compared to that occurring in the initial lesion.

It seems reasonable to recognize with Toulant two types of ocular reactions occurring after anti-syphilitics.

1. Réactions précoces, occurring within a week after treatment usually Jarisch-Herxheimer reactions. 2. Réactions tardives, appearing usually one to three months after arsphenamin. Iridorezidivs belong to this group.

IRITIS AND NEUROSYPHILIS.

A frequent association of iritis with neurosyphilis, symptomatic and asymptomatic has been reported. Trousseau (28) was able to follow the ultimate course of 40 out of 61 patients with syphilitic iritis. Three developed general paresis, twelve tabes dorsalis, eight cerebrospinal syphilis and two others died of visceral, probably cerebral syphilis. Fournier (29) emphasized the association of iritis with severe forms of syphilis and characterizes it as "le présage des mauvaises syphilis."

Of 18 patients who had been observed 8 to 10 years previously with a specific iritis, Igersheimer (30) found one probable case of syphilitic cerebral endarteritis, one of tabes dorsalis, one of general paresis and two others probably neurosyphilitic (hyperactive reflexes). Spinal fluid examination of eight iritides by the same investigator showed six with abnormalities.

Wile and Marshall (31) report a uniformly high association of iritis and spinal fluid abnormalities in untreated early secondary syphilis. In 508 cases of secondary syphilis there were 21 iritides in fifteen of which there were definite changes in the cerebrospinal fluid. Of the entire 508 cases only 35 had pathological fluids.

On the other hand Wernicke (32) considered iritis an assurance against the eventual development of tabes or paresis. Wintersteiner (33) in an ophthalmologic examination of 284 paretics found optic atrophy in 28.5 per cent while choroiditis was observed in only 11 or 3.86 per cent. Syndacker was unable to detect changes resulting from uveitis in 61 tabetics. Not once, moreover, in 79 patients with syphilitic iridocyclitis and 42 with choroiditis did he observe the subsequent development of tabes or paresis.

Mautascheck and Pilcz (35) in their admirable study of syphilitic officers of the Austrian army over a period of several decades conclude that a uveitis is of no prognostic significance, favorable or unfavorable, in regard to the subsequent development of "parasyphilis." They were impressed neither by the rareness or frequency of iritis or choroiditis in dementia paralytica. Of 73 patients who during their infection presented uveal disease 8 or 10.96 per cent developed dementia paralytica, one tabes dorsalis and five cerebro-spinal syphilis.

A high incidence of neurosyphilis in iritics might depend upon three factors.

1. A chiefly cephalic dissemination of spirochetes. Gennerich (36) in this way offers to explain the reported frequent association of alopecia capitis and leukoderma colli with spinal fluid abnormalities. There are no facts to support such a conception.

2. In analogy to the phenomena occurring in rabbit syphilis as described by Brown and Pearce their association might be due to the occurrence of iritis and neurosyphilis at an identical or approximate position in the cycle of tissue reactions.

3. The neurosyphilis may be an extension of a focus in the uveal tract to the optic nerve and thence to the central nervous system.

The almost constant association of papillitis with iritis was reported by Schnabel (37). Though subsequent workers have not found fundal changes so frequent in iritics, yet papillitis and neuroretinitis are commonly found if sought for. Meller (38) has recently emphasized the intimate connection between anterior uveal disease and optic neuritis. In a clinical and pathological study of chronic iridocyclitis of varying etiology (syphilis, tuberculosis, etc.) he has reached the conclusion that optic neuritis in these cases is the result of an extension of the process from the uveal structures. Arising from a focus in the choroid, or by direct extension from the diseased ciliary body to the adjacent retina, the process extends along the retinal lymphatics toward the papilla. It is not necessary to assume that passage of organisms through these channels will in every case produce pathologic changes and even should they occur whether or not such changes will be evident ophthalmoscopically depends upon degree of reaction. Kleinsässer (39) in Meller's clinic found functional disturbances chiefly in the form of relative scotomas in patients with chronic iridocyclitis. Likewise Lippmann (40) in Elschnig's clinic in a perimetic study of 98 eyes with iridocyclitis of various etiologies found 59 with normal fields and 39 with abnormalities for the most part relative central scotomas involving chiefly blue and yellow. Meller leaves open the question whether these disturbances, occurring without ophthalmoscopic changes and

especially if they occur coincident with a rapid improvement of the iridocyclitis, may not be due to a degenerative process of the optic fibres adjacent to the pathways through which toxic products are transported from the eye.

There is at present no data which would indicate the possibility that the spirochæta pallida may pass from the uveal tract by way of the optic nerve to infect the cerebrospinal axis.

Inflammatory or atrophic changes at the papilla in active or quiescent iridocyclitis by no means indicate the existence of a neurosyphilis. In five patients who were first observed with an old inactive iridocyclitis and with a postneuritic atrophy, none showed clinical neurosyphilis and in only one were spinal fluid abnormalities present.

Papillitis associated with uveal disease may originate in three ways.

1. It may originate as an extension of a uveal focus through the retina (Meller).

2. The papillitis may be an expression of an associated basilar meningitis. It is evident that if iritis and basilar meningitis coexist as in two neurorecurrences in Table 2 it may be difficult to determine the origin of the fundal changes.

3. The papillitis may originate as a result of hæmatogenous dissemination independent of the uveal lesion.

SPINAL FLUID EXAMINATION OF PATIENTS WITH IRIDOCYCLITIS ASYMPTOMATIC OF NEUROSYPHILIS.

As determined by routine spinal puncture[1] the incidence of asymptomatic neurosyphilis does not appear to be higher in patients with iridocyclitis than in syphilitics in general. In the following table a distinction is made between whites and negroes inasmuch as neurosyphilis, symptomatic and asymptomatic occurs about twice as frequently in the former than in the latter. All patients were partially treated, in

[1] Spinal fluid examination included cell count, globulin estimation, a Wassermann test with quantities of spinal fluid up to 1 cc with water-bath and ice-box fixation and colloidal gold and mastic test.

most cases with at least one course of arsphenamin before spinal puncture was performed.

IRITIS ASSOCIATED WITH EARLY SECONDARY SYPHILIS.

	Total Spinal fluid Exam.	*Positive*
White	14	3
Colored	16	2

IRITIS, MONOSYMPTOMATIC OR ASSOCIATED WITH TERTIARY SYPHILIS.

White	12	2
Colored	19	2

The above results approximate those obtained by Moore (41) in treated syphilis from a Baltimore clinic. Among 377 white patients in all stages of the disease 60 or 15.9 per cent had abnormal spinal fluids, of 265 negroes 22 or 8.3 per cent showed abnormalities.

THE WASSERMANN REACTION IN ACUTE SYPHILITIC IRITIS.

An estimation of the frequency of a positive Wassermann reaction in syphilitic iritis must take into consideration two factors, first the time during the course of infection at which iritis occurs, secondly previous treatment.

1. Iritis as a manifestation of early secondary syphilis. There were 90 such patients, in which complete fixation occurred in 100 per cent.

2. Iridorezidivs. As in the case of the neurorezidiv these lesions occur constantly in insufficiently treated cases of primary and secondary syphilis with an analogous period between cessation of arsphenamin and onset of recurrent symptoms. In both conditions the Wassermann is frequently negative. Reference to Table 2 shows that in nine instances the Wassermann was negative, in three there was partial complement fixation and in two complete fixation. The negative Wassermann reaction should not mislead in such iritides inasmuch as the history of early syphilis and arsphenamin some weeks earlier will reveal the etiology.

TABLE II

IRIDORECURRENCES

Age	*Original Manifestations*	*Wassermann*	*Treatment*	*Interval between Treatment and Onset of Iridocyclitis*	*Lesions Associated with Iridocyclitis*	*Wassermann' at time of Iritis*	*Spinal Fluid*
1—29 m w	Roseola	4	2.2 g 606	14 weeks		00.00	Negative
2—44 m w	Roseola	4	5 x arsph. 4 x i.m. Hg.	5 weeks		00.02	
3—24 m c	Pust. follic.	4	7 x Arsphen.	4 weeks		00.00	Negative
4—57 m w	Roseola	4	6 x neo.	8 weeks	Choroiditis	00.21	
5—39 m c	Roseola	4	5 x 606 2 g.	7 weeks	Syphilitis meningitis. Left facial paralysis	00.00	Positive
6—28 m c	ii Early	4	1 x 606 4 g.	10 weeks			
7—23 f c	Roseola	4	1 x 606	6 weeks	Neuroretinitis	00.00	Negative
8—32 m w	ii Early	4	4 x neo.	7 weeks	Acute syphilitic meningitis S . VIII Optic neuritis D VII et VIII	00.00	Positive
						44.44	
9—21 f w	ii Early	4	8 x 606	6 weeks			
10—36 m c	ii Early	4	4 x 606 1.2 g.	12 weeks			
11—25 m c	ii Early O.D. Acute Iritis	4	0.9 Neo.	14 weeks	(Acute iritis O.S.)		
12—31 f c	ii Early	4	6 x 606 2.4 g.	8 weeks		00.00	
13—18 f w	mac. pap.	4	7 x neo 4.2 g.	7 weeks		00.00	
14—25 m c	ii Early	?	5 x 606	7 months		00.23	
15—38 m w	Mac. pap.	4	6 x 606 2.4. g.	5 weeks	Chorioretinitis	44.44	Negative

[1] The first two figures indicate two antigens with water-bath fixation, the last two figures with ice-box fixation. The degree of fixation is indicated by the numbers; 1, slight fixation; 2, about 50%; 3, almost complete; 4, 100%.

3. Iritis, monosymptomatic or associated with tertiary lesions.

	Complete Fixation	*Partial*	*Neg.*
Infection under two years	18	0	2
" over " "	22	2	4
" undeterminable	30	2	3

As is true of syphilitic manifestations in general the incidence of a positive Wassermann is less constant with late iritides than with those occurring in early secondary syphilis. In the nine iritides in this group classed as syphilitic in spite of a negative Wassermann are included only such cases as showed a typical pathology of syphilis (two cases of iritis papulosa in which the papules were promptly absorbed by arsphenamin) or such cases as had failed to improve under mydriasis and various other procedures and promptly responded to antisyphilitics.

Just as a negative Wassermann may at times deceive into discarding syphilis as a causative factor, so a positive reaction will at times lead to error. According to statistics derived from admissions to the free wards of the Johns Hopkins Hospital (42) routine Wassermann examinations indicate an incidence of positive reactions in 8.8 per cent of whites and in 37.6 per cent of negroes. Assuming that 20 to 30 per cent of iritides in whites are syphilitic and 80 per cent in colored (Clapp) (43) it may be estimated that among a Dispensary class there will be an association of a positive Wassermann and a nonsyphilitic iritis in 6 or 7 of every 100 iritides among the former and in about seven in the latter.

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THE MICHEL METAL SUTURE IN SPASTIC ENTROPION.[1]

By Dr. RALPH I. LLOYD, Brooklyn, N. Y.

(With one illustration on Text-Plate XXV.)

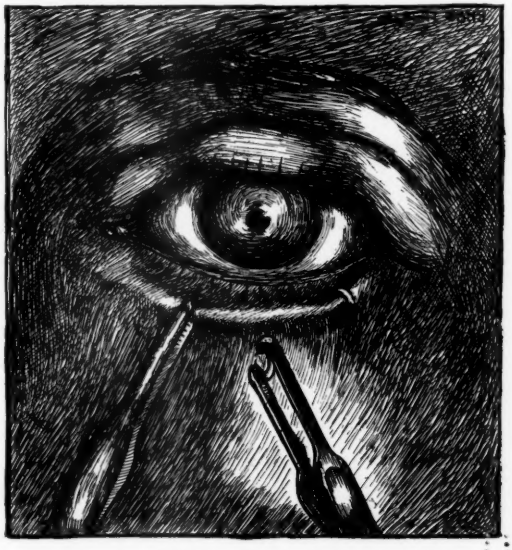
THE patient who develops spastic entropion upon slight provocation is the individual who begins to squeeze his lids together as soon as the examining hand approaches his eyes, even if there is no disease present. When asked to look up, he usually opens his mouth and closes his lids more firmly. These patients are the burden of the cataract operator and to any one who has held the "lid hooks" for such a case for any operation; the tremulous but firm resistance these patients offer, is a familiar but not pleasant experience.

Given this "squeezers' diathesis," a foreign body or a slight infection is sufficient local cause for continued spastic lid closure, which will often turn the lid in against the eye-ball and the ends of the eye-lashes will strike the cornea. A vicious circle is thus established which after many days usually, begins to produce a rather characteristic ulcer of the cornea, which is superficial but broad; and may cover the whole lower half of the cornea. The cornea resists the continual pricking by the cilia ends for what seems to me to be a long time. But when this ulcer is once established, it is very slow to heal even if we are able to establish ideal conditions. Of course, the first effort is to end the inversion of the lid and the methods used include adhesive plaster, collodion and even a deep cutaneous stitch.

The moisture which continually escapes from the eye soon loosens the adhesive plaster which seldom is efficacious for

[1] Read before the Brooklyn Ophthalmological Society.

ILLUSTRATING DR. RALPH I. LLOYD'S ARTICLE, "THE MICHEL METAL SUTURE IN SPASTIC ENTROPION."



more than an hour or so. Collodion will occasionally do more but is difficult to apply because the ether fumes from the collodion irritate the eye, already abnormally sensitive, and it is hardly possible to get dry skin for the collodion to adhere to.

The subcutaneous stitch will work, if properly inserted, for about two days when the tissues about the thread begin to give way and the relaxation is soon sufficient to demand another pair of stitches, which are to be replaced in turn and so on.

An operation of any kind which removes a fold of skin will be successful if union by first intention results; otherwise you are very much worse off than in the original state. Any operation to promise success must premise the removal of integument close to the margin of the lid and this is the tissue which is essential to success by any method known, if the operation should fail. The Ziegler cautery puncture is undoubtedly the operation or procedure of choice in a chronic or cicatricial case but it takes time for the cicatrizing of the lid cartilage to occur.

A case of the typical spastic type with a large superficial corneal ulcer came into Cumberland Hospital, September, 1923.

This man of 60 years, had been treated at various dispensaries for more than a month and the right lower lid was inverted and the ends of the cilia were digging into the cornea, the lower half of which was superficially ulcerated. Adhesive plaster had failed before I saw him and operation seemed the only thing to immediately and continuously remove the entropion, without which it seemed impossible to expect results.

The Michel metal suture, which is such an admirable adjunct to any surgical procedure which demands prompt sealing of a wound in the skin, came into my mind and the experiment was begun. After trying first one way and then another, the following worked out as the way to success. Two clips are necessary to keep the lid from inverting, one should be placed about the center of the lower lid and the other midway to the external canthus. They will hold very well indeed for 48 hours, after which time, the hole in which the points rest, enlarges and allows the point to drop down into the hole and

the relaxation which follows is sufficient to permit the lid to again invert, and in a few hours, the good accomplished in many days can be undone. At the end of 48 hours, these two clips should be removed and two others take the places of those removed.

These last two are placed just beside the holes left by the removal of the first pair and in a couple of days, the hole just vacated is healed.

In this way, by moving about a bit, the lids are kept in good shape. Clips applied internal to the center of the lid, do little good. A pair of rat-toothed forceps; such as are used to fix the eye-ball in cataract and other operations, are used to grasp the tissue of the lower lid, one blade close to the lid margin and the other well down on the lower lid toward the bony margin and with this fold held firmly in the grasp of the forcep; the clip is applied and while painful, is much less of trial than a suture through the skin. The ulcer of the cornea heals more rapidly if treated every other day with pure carbolic acid, applied on a tightly wound, cotton tipped applicator, so no surplus can injure adjacent tissue. The next question which will arise is whether it is best to keep the eye closed or not. These clips, in position, will entangle in cotton or gauze pads and if unskillful hands are to remove and apply dressings to instil drops; it will be found better to shut the eye up and omit other treatment oftener than once daily. If skill and tact is employed in handling these cases, there is no objection to changing dressings frequently and instilling drops. As soon as the ulcer is healed, it is best to leave the eye open unless the patient is still squeezing. It will take a month at least, for one of these ulcers to heal and by that time, the squeezing habit is usually broken up by constant use of clips and their discontinuance can be tried with the eye shaded. The clips leave no marks upon the lower lid unless allowed to remain in place for three or four days; by which time, a large round hole has sloughed. Even this mark passes, so two months afterward, it is hard to tell that anything had ever been used.

The clips cannot be well applied without the aid of the broad bladed fixation forceps but with them, a large fold of skin can be included and the patient cannot then invert his

lid. If the clip is placed with a small grip near the margin of the lid, it may be turned into the eye and do more damage than the inverted cilia but if the fold is large and one clip point is close to the lid margin and the other is well down on the lid, results are certain.

SOME OBSERVATIONS ON BLOCKING OF THE FIFTH AND SEVENTH NERVES AS AN ACCESSORY IN CATARACT OPERATIONS.[1]

[By Dr. J. MATHEWS ROBISON, Houston, Texas.

(Late House Surgeon Manhattan Eye, Ear and Throat Hospital, New York City.)

A REVIEW of the literature pertaining to the methods of blocking the facial nerve preliminary to cataract extraction reveals that Van Lint, of Brussels (*Ophthalmoscope*, 1914) advised, as a measure to produce paresis of the orbicularis oculi, the injection of four *cc* of one percent novocain along lines about four *cm* long, following the external orbital margins, converging to a point two *cm* lateral to the external canthus. This produced paresis in twenty minutes, the operation being carried out thirty minutes to one hour after injection.

Villard (*Ophthalmic Literature*, 1920) advised giving a cup of strong coffee fifteen minutes before injection. He then introduced a needle four *cm* long above and to the outside of the eyebrow, slanted it downward toward the malar bone, and injected two *cc* of a 1 to 500 solution of cocaine. The needle was then withdrawn and inserted at the extreme end of the first injection and an injection of two *cc* made medially toward the upper part of the alæ nasæ, parallel to and one *cm* below the margin of the orbit. If insufficient paresis resulted from this injection, the needle was inserted again one to two *cm* from the external canthus and an injection four *cm* long made toward the parotid gland. If this still failed to produce

[1] Read by invitation March 17, 1924, before the Ophthalmic Section of the New York Academy of Medicine.

sufficient paresis, two additional tracts were injected, each being fifteen degrees from the latter one above and one below. These injections were made so as to infiltrate both superficial and deep tissue, the resulting paresis having a duration of fifteen minutes. Villard says this injection is indispensable in cataract extraction in capsule.

Major R. E. Wright, of Madras, India (*American Journal of Ophthalmology*, June, 1921), reports injecting with two percent novocain five minutes before operation, the total amount used not being stated. The needle was entered over the center of the zygoma and, following the line of the latter, was passed to the pinna. As the needle was withdrawn the infiltration was effected. Then the needle was turned in the opposite direction and in the same line, was passed to a point below the center of the eye, and this tract infiltrated. Wright (*Archives of Ophthalmology*, March, 1923) also reports injecting the main trunk of the facial nerve at the stylomastoid foramen in a number of cases with one half to two *cc* of two percent novocain. In a majority, the effect was negative. When the paresis did occur it began in fifteen minutes and lasted for one hour.

Dr. George S. Derby, of Boston (*Journal of American Medical Association*, December, 1923), has used a technique extensively, which consists of inserting the needle slightly posterior to the point where the vertical tangent of the external wall of the orbit meets the horizontal tangent of the lower orbital margin. The needle is introduced along the lower orbital margin close to the bone so far that the injection will reach medially to the line of the inner canthus. The needle is then withdrawn and introduced upward along the external. margin of the orbit until the injection reaches the level of the upper margin of the orbital wall. Two *cc* of procain with adrenalin are used, one *cc* for each injection tract. The full effects of this injection are manifested in about ten or fifteen minutes, the effects lasting an hour or more.

In using these various types of injections in a number of clinic patients at the Manhattan Eye, Ear and Throat Hospital, it was found that any of them is effectual in patients with poorly developed musculature. However, in injecting patients having varying orbital indices, with varying development of their musculature, it was often found that the cor-

rugator supercilii and angular head of the quadratus labii superioris, which act in an accessory manner in forceful closure of the lids, were difficult to render effectually paretic unless the tissues lateral to the orbit were loaded with novocain until a condition of diffuse œdema was produced.

That these accessory muscles are difficult to paralyze is substantiated by Major Wright, who reports that one of his patients squeezed forcibly after injection and he also reports that in several cases muscular action was apparently exercised by the nasal muscles and corrugator on the side injected in conjunction with the orbicularis of the opposite side. Dr. Derby also reports that one of his cases succeeded in squeezing out the speculum. However, he adds that the injection was probably not properly made.

In order to determine where novocain might be injected in small amounts and produce the greatest degree of paresis, a number of cases which had had an enucleation of the globe done some six or eight weeks previously was selected and a small balloon made of rubber, having an elastic index of thirty *mm* of mercury, was inserted in the socket. This balloon was connected by rubber tubing to a three way glass tube. The second arm of the tube was connected to a blood pressure mercury manometer, the third arm being connected to the ordinary air pump. When this balloon was put into the socket and inflated until the lids on the side being tested corresponded to the contour of the lids on the opposite side and the patient asked to forcefully close his eye, there was an excursion of mercury produced proportionate to the individual's muscular development, and when paresis was produced by injecting novocain there was an excursion produced proportionate to the degree of paresis. The greatest excursion produced before injection was seventy *mm*, the smallest was twenty-five *mm*.

The technic evolved as a result of these experiments and the experimental injection of a number of patients prior to operation, consists in injecting in three regions, the first being between the supra-orbital notch and the center of the inner canthal ligament, the second being between the infra-orbital foramen and the center of the inner canthal ligament, and the third being along a line drawn tangent to the lateral orbital

margin. The first and second injections have as their objective, the production of paresis of the corrugator supercilii, the angular head of the quadratus labii superioris and part of the orbicularis oculi; the third injection has as its objective, the more complete paresis of the orbicularis oculi. It has not been found necessary to produce paresis of the infra-orbital and zygomatic heads of the quadratus labii superioris or the frontalis for though these muscles impart considerable motion to some of the tissues surrounding the orbit, they are unable to produce pressure on the contents of the orbit unless acting in conjunction with the orbicularis oculi.

The first procedure, taking advantage of the fact that muscules in general acquire their motor nerves near their bony origin, consists in entering the hypodermic needle at the supraorbital notch and infiltrating the tissues of the lid between the notch and the inner canthal ligament, following the contour of the bone, with one *cc* of two percent novocain, care being taken to keep the solution superficial to the septum orbital. The needle is then withdrawn and inserted at the infra-orbital foramen and one *cc* of two percent novocain is infiltrated between this point and the inner canthal ligament. When the region of the lacrimal sac is reached the needle point is passed anterior to it. This injection produces a profound paresis of the corrugator supercilii and the angular head of the quadratus labii superioris and in patients with poorly developed muscles, renders the orbicularis oculi sufficiently paretic to make it harmless from an operative standpoint.

The facial nerve enters the orbicularis oculi over its entire medial half (Whitnall, *Anatomy of the Human Orbit*) and this injection, though effectively blocking the accessory muscles, will not produce, in individuals with well developed musculature, sufficient paresis of the orbicularis to prevent the forceful action of its most peripheral lateral fibers. Additional paresis of the orbicularis is obtained by entering the needle two *cm* lateral and in line with the external canthus and injecting four *cc* of one half of one percent novocain along a line drawn tangent to the lateral margin of the orbit with a slight curve medially, extending a little beyond the level of the superior and inferior orbital margins. This injection is made next to the periosteum in its inferior extent but, in its superior

tract care must be taken that the needle is kept superficial to the aponeurosis of the temperal muscle or the injected fluid will be dissipated. This second injection may be entirely omitted in some patients, but the combination of the two injections will effectively control the strongest musculature and may necessitate the insertion of a suture near the lid margins to approximate them after operation, if it is used on patients having very weak muscles.

These injections are best made after the patient arrives in the operating room and is prepared for operation. The full effect of the injection, when kept under pressure, is usually manifest within one to three minutes. The time factor of this method of injection has, as its anatomical basis, the fact that the temporal and zygomatic branches of the facial nerve, which supply the accessory muscles of forceful closure of the lids, are blocked near the inner canthus where the nerve trunks are small just before they pierce the muscules near their bony origin; where a line drawn tangent to the external orbital margin intersects the temporal and zygomatic branches, they are often of considerable size and in muscular subjects, are deeply embedded, and their blocking in this locality requires a larger amount of solution, the infiltrating of a greater amount of tissue, and waiting for a longer period before the conduction effects become manifest. Its duration in cataract cases is not known but in some of the enucleated patients injected, sufficient strength returned within fifteen or twenty minutes to permit their forceful contraction.

This technique may quite readily be varied to include complete anesthesia with paresis of the lids. This is obtained by injecting ten minims of two percent novocain posterior to the septum orbital at the supra-orbital notch, withdrawing until the septum offers no resistance to the needle being passed medially and, as the region of the trochlear spine is reached during the lid infiltration, the needle is again put through the septum and ten minims injected. The needle is withdrawn from beneath the septum again and the lid infiltration continued. This effectively blocks the supra-orbital, supratrochlear and infratrochlear nerves. Ten minims of novocain are injected into the infra-orbital foramen and the infiltration of the lower lid continued. The lacrimal nerve is then blocked

by injecting ten minims of novocain posterior to the septum orbitale, the needle puncture being made just below the zygomaticofrontal suture which, according to Whitnall, can always be palpated. In making the injection tangent to the external orbital margin, care is taken to place novocain over the zygomaticofacial foramen, which usually lies one half *cm* lateral to the orbital margin and on a level with a line tangent to its lower border. The combination of anesthesia with paresis of the lids has certain advantages which become manifest when used in a large clinic on various types of patients. Often the paresis produced is so great that the lids have to be separated very widely before they will retain a speculum. This abnormal stretching of the skin is in itself, often a sufficient stimulus to prevent the patient controlling the motor muscles of the globe but, if anesthesia of the lids is present, the patient does not feel the speculum or the skin stretching and a greater separation than usual may be obtained.

If the paresis produced prevents the patient closing the lids, a suture may be inserted after the operation, without discomfort or danger to the patient. Anesthesia of the lids also is an aid in patients with deep set eyes and in cases with narrow palpebral fissures where it is often difficult or impossible to obtain a good conjunctival flap without touching the lid margin with the knife unless an external canthotomy is done. It also effectively breaks the trigeminal oculomotor and trigeminal facial reflex arcs and produces an operative field comparable to ether anesthesia without the loss of the coöperation of the patient.

In injecting novocain in the region of the lids, the anatomy of the septum orbitale must be respected for this sheet of fascia will influence the distribution of the novocain and its subsequent physiological effect, in the same manner that it influences the distribution of hemorrhages in this region. If novocain is introduced posterior to the septum in an attempt to produce paresis of the muscles there will be no effect for the septum will effectually prevent the solution reaching their motor nerves; likewise, in infiltrating the lid for anesthesia, care must be taken to keep the solution anterior to the septum or the results will be disappointing. However, if a nerve is to be blocked as it leaves the orbital margin, clinical evidence

supports the view that the injection is most effectually made just posterior to the septum. This may be due to the fact that the septum is closely applied to the orbicularis anteriorly, while posteriorly its surface is comparatively free, thus allowing the injected solution to spread over a greater area with greater probability of its coming in contact with the nerve trunk or its subdivisions. The septum orbitale is in its thinnest portion in the medial half of the lower lid and here it offers no resistance to the injecting needle, but, in all other parts of the lids, if the needle is passed through the septum, a definite obstruction will be met if an attempt is made to advance the needle parallel to the lid margin.

The existence of the sensorimotor plexus, together with the marked overlapping of the areas of cutaneous distribution of the branches of the trigeminal, usually renders the blocking of one or two nerves unsatisfactory for operative procedure. This is in accord with the findings of Zander (1897—Quoted from Whitnall), who found, after sectioning the various branches of the trigeminal, that the cutaneous distribution is so inconstant that he never found two identical fields, even on the two sides of the same head, this overlapping being greatest on the nasal side. Therefore, when block anesthesia is used for operating in any region on either lid, it is often necessary to block all the nerves which emerge around the orbit. This is particularly true of the lid margin. After blocking these cutaneous nerves the full effects are usually manifest in about one minute and last about fifteen minutes, at which time a second injection can be made. However, a second injection does not produce as good results as the first, and a third injection will produce very little effect. This may be due to the perineural œdema set up by the injections, which œdema prevents the novocain from being absorbed by the nerve.

Efforts have been made to obtain anesthesia of the conjunctiva by blocking methods, in cases where the conjunctiva was inflamed and immune to the drop method, but these efforts, so far, have been futile. This may be due to the omission of attempts to block the ciliary nerves by deep orbital injections but these deep orbital injections have not been used, except for enucleation, due to the possible complications of deep orbital hematoma and infection.

During the past nine months at the Manhattan Eye, Ear and Throat Hospital, there were twenty-seven cataract cases injected, in which various technics were employed in an effort to produce paresis by blocking the facial nerve. Sixty two cataract cases were injected so as to produce a combination of anesthesia and paresis of the lids. The facial nerve was also blocked in seven cases of acute inflammatory glaucoma, and on four patients prior to an iridectomy preliminary to cataract extraction.

Blocking of the branches of the trigeminal was used in five Gillet de Grandment operations for ptosis, six dacrocystectomies and fourteen plastic lid operations of various types. There were no complications due to the injection of any of these cases, except two of the first few injected, which developed small hematomata in the region of the zygoma. Since these occurred, firm pressure with a cotton sponge has always been made, for about one minute, over the entire length of each injection tract. This pressure, besides preventing the formation of hematomata, also adds to the rapidity with which the injected fluid takes effect. No infection nor post injection neuralgia has occurred, the only post injection evidence in the lids being a slight puffiness of the tissues, which has always subsided without attention. Adrenalin has been omitted from all the injections in cataract cases, as a precaution against intra-ocular hemorrhage, but the combination of adrenalin with novocain has rendered anesthesia effective over a longer period than novocain when used alone.

CONCLUSIONS. First, a more complete paresis of the accessory muscles of forceful closure of the lids is often desired, as a preliminary to cataract extraction and is most easily acquired by blocking the nerves near the bony origin of the muscles.

Second, the combination of anesthesia with paresis of the lids has numerous advantages which become manifest when used routinely on clinic patients.

Third, considering the uniformly good results obtained at the Manhattan Eye, Ear and Throat Hospital, and other large clinics, by producing paresis of the orbicularis oculi and its accessory muscles prior to cataract extraction, the trend of medical opinion in this country is fast drifting toward the

attitude that a surgeon who performs any ocular operation which entails a large section of the globe, cannot be considered as giving his patient advantage of all the factors of safety unless he employs some method of producing paresis of those circumorbital muscles whose action might prevent the successful termination of the operation.

GENERAL ANESTHESIA IN OPHTHALMIC PRACTICE.[1]

By Dr. JAMES T. GWATHMEY, New York.

THE question of whether local, general, infiltration, or other method of anesthesia should be used, must be determined from the standpoint of safety for the patient, and, second, the ability of the surgeon to perform a given operation in ease and comfort. All general anesthetics given by inhalation have three stages; first, the introduction; second, the excitement stage; and third, surgical anesthesia. The next stage is the danger zone, or death. The third, or surgical stage is divided into three zones: light, medium, and deep anesthesia. Each of these zones is easily distinguished by modifications of respiration, circulation, color, lid reflex, and the orbit. In ophthalmic surgery, if any of the general anesthetics is used alone, without preliminary medication, the patient must be plunged into the third zone of surgical anesthesia. As the next is the danger zone with the possibility of death, it is evident that a general anesthetic should not be given, unless it can be done so that it would be as safe as any other method. This, however, can be easily accomplished. The patient can be kept in the first zone of the third stage—two zones removed from danger—fully relaxed, by proper preliminary medication when supplemented by inhalation anesthesia.

A series of experiments has been made to determine whether or not an animal was safer with or without preliminary medication. Ether was given intravenously in normal saline solution, as in this way the total amount of ether used could be

[1] Read before the Ophthalmic Section of the Academy of Medicine, March 17, 1924.

determined accurately. Note was taken when complete anesthesia had taken place and again when respiratory paralysis occurred. It was found that the margin of safety was greatly increased with preliminary medication. For instance, without preliminary medication it required only 99*cc* more ether solution to produce respiratory failure; whereas with preliminary medication it required over twice as much, or 245 *cc* to produce the same effect. With preliminary medication, the excitement stage is eliminated, in both animal and man, and anesthesia comes on sooner.

Buchanan and Patterson, using the open drop ether method of inhalation, found that when morphine and atropine was given preliminarily, 20 per cent. had nausea and vomiting. Without preliminary medication, this was increased to over 50 per cent. Since the nausea and vomiting from morphine comes on usually as the effect is wearing off, this 20 per cent. is still further reduced, and the analgesia very greatly prolonged by giving the morphine in magnesium sulphate instead of plain water. In the report of the Committee appointed by the A. M. A. on the toxic effects following the use of local anesthetics, detailing 43 unpublished deaths, the statement that "morphine and scopolamin increase the danger from the use of chloroform and ether"; and also Macht's statement, in the same report, that "to give a general anesthetic on top of a local anesthetic is a very dangerous procedure," are misleading; unless a third zone, third stage inhalation anesthesia is superimposed upon either the morphine or the local anesthetic. With morphine given preliminarily, or when a local agent is used, it is necessary only to induce unconsciousness by inhalation. The patient will then be fully relaxed and removed by two zones from danger. Without the preliminary or local, the patient must be carried to the danger zone in order to get the same relaxation.

During the war, in the laboratories of the A. E. F., Dijon, we found that a large dog could be easily and safely anesthetized when given $\frac{1}{8}$ of a grain of morphine preliminarily, followed by nitrous oxide and oxygen given by inhalation for unconsciousness, or only to the first zone of the third stage. This observation was fully verified clinically with soldiers shot through the chest or belly, following precisely the same technique. We agree with the Committee that "Morphine

has a distinct field of usefulness in allaying the apprehension of nervous patients before operation," but "a note of warning" is unnecessary if the anesthetist meets the preliminary with a stage of unconsciousness. The morphine is only dangerous when it is overlapped. Within the last six months a patient died of fright in one of our large hospitals before the anesthetic was administered. I have never known a patient to die from preliminary medication; but I do know of two cases dying on the table when the medication was withheld, and consequently the anesthetic had to be pushed to the danger zone.

Preliminary medication means the difference between safe and unsafe inhalation anesthesia, between guess work and certainty, and sometimes the difference between life and death itself. All methods of anesthesia are rendered safer and more satisfactory by proper preliminary medication. I have dwelt upon this point because ophthalmic surgeons, as a rule, use inhalation anesthesia infrequently. The question now arises: How shall we supplement the preliminary?

With a mixture of 70 per cent. ethylene, 10 per cent. nitrous oxide, and 20 per cent. oxygen, a safe and satisfactory anesthesia can be induced and maintained indefinitely. Ethylene acts in the blood in the same way as does nitrous oxide, viz., in a physical solution, no chemical changes taking place. The detonating or explosion point of ethylene is, for all practical purposes, the same as for ether, and the same precautions must be exercised. A death from ethylene, as reported in the papers, when the actual cautery was used within a few inches of the face mask, should deter no one from using this agent. The same result would probably have occured had ether been used.

When ether is given colonically, mucus, saliva, nausea and vomiting do not occur, as they do when given by inhalation. The method of distribution is entirely different, much greater relaxation ensuing and a much smaller amount of ether being used. This method is especially indicated in plastic surgery or where the surgeon does not wish to be interfered with by the anesthetist or his apparatus. Where the patient is in an extreme condition, one quart of normal saline with 5 per cent. bicarbonate of soda and 5 per cent. glucose, given by rectum one hour before the operation, with $\frac{3}{8}$ gr. of morphine given in

$\frac{1}{8}$ dr. doses in 2*cc* of a 25 per cent. solution of magnesium sulphate, *i.e.*, the patient getting $\frac{1}{8}$ gr. morphine and 6*cc* of a 25 per cent. solution of magnesium sulphate. The first dose to be given one and a half hours before operation, and repeated every twenty minutes, and supplemented by ethylene, nitrous oxide, and oxygen, insure a safe and satisfactory method of anesthesia for ophthalmic surgery. With this technique nausea, vomiting, wound and gas pains are almost entirely eliminated.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SECTION OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. H. DICKINSON, London.

MEETING OF MARCH 14TH.

A clinical meeting of the Section was held on March 14th at the National Hospital for the Paralyzed and Epileptic, Queen Square, Bloomsbury, when the chair was occupied by the Section President, Mr. A. L. Whitehead, of Leeds.

Mr. Leslie Paton showed four cases of **cerebro-macular degeneration,** three of them belonging to one family. The youngest boy was now aged 8, the oldest 11. All the cases commenced to show the condition at the period of the second dentition. Having two of the cases under care, the third was carefully watched, and now there were to be seen the first changes evident in the macula in this disease. The girl showed the second stage of the disease, and the elder boy the third stage. The fourth stage was seen in a pathological specimen. The youngest boy now had fits, in which he became spastic, but there was as yet no permanent spasticity. Nine months ago the elder boy was more spastic than now. He thought these cases should be classed with the cases of Tay-Sachs amaurotic family idiocy. Recently he saw two cases which began at about puberty, with the macular changes progressing almost to blindness, but with very little in the way of mental symptoms, except a distinct irritability of temper. Recently there had been in the hospital a case of the Tay-Sachs type of gentile parentage. In many cases the cerebellar changes were very marked. The chief changes in the central nervous system seemed to be a lipoid infiltration of the tissues,

mainly in the vegetative portion, as distinct from the neurofibrillar portion.

Dr. GORDON HOLMES demonstrated, by means of the epidiascope, the minute **changes in the cerebral components.** These included a swelling of the dendrites, very much like that seen in amaurotic family idiocy. The cerebellum showed an enormous interstitial change. Also there was considerable proliferation of neuroglia.

Mr. PATON next showed a case of **spleno-medullary leukæmia** to demonstrate the retinal appearances. At first there was a little patch of reddening, with œdema and some stippling, and later that was replaced by an atrophic white area containing pigment, and a bright red patch in the center of it. Since then there had been a great distention of veins. The visual field showed very little change.

He also showed a case of **voluntary nystagmus.** The man could do it best in bright daylight; it produced in him slight giddiness. Vision (with correction) with $\frac{6}{6}$, and he had $\frac{1}{2}$D. astigmatism.

Dr. GORDON HOLMES exhibited a patient with **paresis of lateral adduction of internal recti,** with intact convergence. Evidently the man had a bilateral lesion involving the tracts from the pons, on both sides of the middle line. The history suggested a vascular lesion. After a Sunday afternoon nap he woke up to find he was seeing double. His blood pressure was somewhat high, and his palpable arteries were thickened.

Dr. WYLIE showed two cases of **osteitis deformans,** with radiographic evidence of the disease in an advanced form. Optic atrophy had occurred, probably by pressure at the foramina at the base of the skull affecting the nerve. Wassermann was negative in both, and there was nothing to suggest syphilis.

Mr. PATON narrated details of a similar case of his own.

MISS IDA MANN showed an infant with **orbital tumor.** The mother was healthy, delivery was normal, and at birth the child was healthy. At 5 weeks the eye was seen to be somewhat displaced upwards and inwards, and the upper lid could not be completely raised. A week later, nodules appeared in the skin over the body, and now numbered 23. A skiagram showed that the left orbit was enlarged, and part of the malar

bone was destroyed. There was little help to be gained from the blood count. Sections of two of the skin growths showed only fibrous tissue and some thickening of epidermis. There was nothing in the case to support the idea of chloroma. Possibly both orbital and skin tumors might be secondary to adrenal sarcoma.

Dr. D. L. DAVIES (Cardiff) referred to a somewhat similar case at the other extreme of life, in a woman aged 76, who said that 40 years previously she had been treated for malignant disease of the tongue. There were many skin nodules, and after death the nodules were found to be endotheliomata, and peritoneum and liver were studded with them.

THE PRESIDENT recommended treatment by deep X-rays.

Dr. CARMICHAEL exhibited a case of what had been **gumma of choroid.** There was a distinct swelling in the region of the macula, of yellow color, and raised 4D. Since active anti-syphilitic treatment was carried out the condition had completely cleared up leaving no result, not even a scar.

Mr. HOWELL CRITCHLEY showed a girl with a **retro-orbital tumor.** There was a five weeks history of exophthalmos of the right eye, and headache and vomiting for 4 or 5 days. The right eye was proptosed, but there was no loss of upward movement in it. There was very intense papilledema, 5D. of swelling. Skull skiagraphy and Wassermann were negative, and the blood count excluded chloroma.

Mr. TREACHER COLLINS pointed out that there was marked hypermetropia in the eye in addition to the papilledema, indicating much pressure on the posterior surface of the globe, flattening it from before backwards. He considered there was a growth in the cone of muscles behind the globe; the possibility of it being a tumor of the optic nerve was very strong, and he advised exploratory operation, via the upper canthus and external rectus.

Mr. F. JULER showed a case of **essential shrinking of the conjunctiva,** an extreme case of pemphigus of the conjunctiva. The patient had been blind five years, and trouble in the eye began two years before that. During nine years she had been having blisters in the mouth the size of a pea and they burst and caused much pain.

MEETING OF JUNE 13TH.

A meeting of the Section was held on Friday, June 13th, under the chairmanship of the President of the Section, Mr. A. L. WHITEHEAD (Leeds).

Case of Peripheral Spots (for diagnosis).

Mr. WILLIAMSON NOBLE showed a patient with numerous yellowish white dots in the fundus. When first seen, the appearance suggested that the case was one of retinitis punctata albescens. The peripheral part of the fundi was slightly albinotic, and here some of the retinal pigment could be made out; but the change was not more marked than that frequently seen in the periphery of an ordinary albinotic fundus. The fields of vision were full, there was no night blindness, and the vision in each eye, with correction and a dilated pupil, was $\frac{6}{9}$ full. It therefore seemed unlikely that the condition could be retinitis punctata albescens. A possibility was that the condition might be due to multiple colloid excrescences of the membrane of Bruch. The late George Coats published such a case in the Transactions of the Ophthalmological Society, vol. xxxi, in which the ophthalmoscopic findings were verified by subsequent pathological examination. Mr. Coats described the affected areas as having a flat scaly appearance, which showed a distinct glitter on movement of the light, and seemed to be a little raised above the level of the fundus. The patient when first seen, had been suffering from bilateral glaucoma for nine months, and the vision in the right eye was reduced to perception of fingers at 3 feet, and in the left eye to perception of light. The appearances did not, except superficially, resemble those in the present case; in the latter the dots were much smaller, did not glitter, and did not seem to be raised above the general level of the fundus. Mr. Eason saw this present case in 1912, but that gentleman had no record of any abnormality of the fundus, though he remarked that such evidence was of only negative value.

To sum, up, this was a case of symmetrical change in the two fundi, consisting of numerous yellowish-white dots in the mid-peripheral zone, producing no symptoms. The patient

had a negative Wassermann, and the urine was normal. Mr. Williamson Noble said he did not see how such an extensive change could be inflammatory and yet produce no loss of vision, and he suggested, as a possible explanation, that the dots represented small localized bosses of the retinal pigment epithelium, a sort of negative freckling. He expressed his thanks to Mr. Oliver for seeing the case when he himself was away from the hospital.

Dr. RAYNER D. BATTEN showed illustrations of two cases having a similar appearance, in which also there was no visual defect. One had been under observation 20 years, without any material change occurring, and there was nothing present pointing to inflammation.

Mr. MALCOLM HEPBURN said he thought these cases were generally hyaline degenerations of the membrane of Bruch. As a rule, the degeneration areas were surrounded by a small aureole of pigment; he did not see much of the latter in the present case, but that did not necessarily militate against the diagnosis he had suggested.

THE PRESIDENT said his feeling was that they were degenerative changes of a congenital character.

A Modification of Elliot's Scotometer.

Mr. FRANK JULER exhibited a modification of Elliot's scotometer which he had devised. He expressed much admiration for the original instrument, the chief drawback of which was that it needed an assistant to the observer to help in the recording of the readings, as the indicator was at the back of the instrument. He got Messrs. Weiss to fix a rim round the edge of the rotary screen, marked by angular degrees so that the markings could be seen from the front. This constituted a one-man instrument.

Mr. R. PICKARD (of Exeter) described a method he had used, and which required none but the observer to employ. He had a canvas screen painted in dead black, and tangent circles, also in black, raised somewhat above the general surface, which enabled them to be read. He could take his readings with this rapidly and accurately.

The Relationship between Subarachnoid and Intra-ocular Hæmorrhage.

Dr. GEORGE RIDDOCH and Mr. CHARLES GOULDEN collaborated in an exhaustive treatment of this subject.

Dr. Riddoch said the not infrequent occurrence of hæmorrhage into the subarachnoid space within the skull had long been known, but mainly as a cause of death in cases in which an incorrect diagnosis had been made during life. No distinctive symptomatology had been associated with it, hence it was regarded as unrecognizable at the bedside, and its outcome was regarded as fatal. But it had been found that the presence of blood on lumbar puncture indicated bleeding into the subarachnoid space.

Ætiologically, there were three main groups of cases: (1) Those with traumatic rupture of meningeal vessels; (2) Cases of bleeding into the subarachnoid space secondary to intracranial hæmorrhage; (3) Cases of primary non-traumatic rupture of a meningeal vessel or aneurysm. The third group was the most interesting, and knowledge on this had been much added to by Symonds, so that it could now be diagnosed with reasonable certainty without the aid of lumbar puncture. Cases of it were often of an age when intra-cerebral hæmorrhage was not very common. In the present authors' series the ages were 43, 44, 46 and 53. Several authorities attributed the lesion to rupture of a congenital aneurysm of one of the basal arteries. Arterial hypertension was often absent from these cases. A frequent feature of such hæmorrhage was bleeding into one or both eyes. One of the four patients here reported died, and an eye was removed and examined histologically with the object of ascertaining by what means the intraocular hæmorrhage occurred. The contributions dealt with this case specially.

The man was aged 44, and he was admitted to London Hospital last February, under Mr. Russell Howard. His previous health had been good, except that he probably had sunstroke while in Palestine. While going upstairs he suddenly fell down, but did not lose consciousness and walked up to his room. A little later he was heard to fall and was found unconscious. He had three successive fits at short intervals,

foaming at the mouth; he was convulsed and cyanosed. In the second fit, opisthotonos occurred. He was admitted to London Hospital in a state of "cerebral irritation"; he resented examination or questioning. His pupils were of medium size, equal, and reacted to light and to accommodation; ocular movements were full. All tendon jerks were exaggerated, and the plantar response was extensor on both sides. Sensation seemed good. Blood pressure readings were 140–80; temperature 97° F. pulse 100, full and strong; respiration 24. Three days later his muscles were flaccid, his tendon jerks were difficult to evoke, but the plantar reflexes were normal. Three days later still he had diplopia on looking to the right, and his tendon reflexes were absent. In a day or two the diplopia disappeared, but otherwise there was no change. A few days later he had difficulty in swallowing, and was very drowsy, the left side of his face was weak, and his tongue was protruded to the left. No tendon jerks could be obtained, and, for the first time, there was incontinence of urine. The blood pressure was 140–90. Twelve days after admission he was stuporous and cyanosed, the breathing sterterous, at 34 per minute, pulse 114, temperature 102° F. Both fundi showed hæmorrhages in the neighborhood of the disks, and the latter were swollen. The left fundus showed two large crescentic hæmorrhages along the inferior veins near the disk margin. The pupils were equal, and reacted well to light; there was a flaccid left hemiplegia. The heart's apex beat could not be felt, and his noisy breathing prevented the heart sounds being heard. The base of each lung was congested. The lumbar fluid was pink, and contained blood and a slight excess of lymphocytes. Wassermann was neg tive. He died on the 13th day of his illness, with a temperature of 104.2°, pulse 132, and respiration 62. Red-brown blood and a small blood clot, together a few drachms, were found in the subdural space, and in the posterior part of the longitudinal fissure were two symmetrical areas of subarachnoid hemorrhage; other collections of blood were scattered over the cerebral convexities, and much red and brown blood clot lay under the arachnoid in the right Sylvian fissure, and a smaller amount in the left Sylvian fissure, anterior part of the median fissure and cisterna basalis. A saccular aneurysm, 1 *cm* in diameter,

projected backwards from the right intracranial carotid at the origin of the right middle cerebral, and it had been ruptured at its inner pole. Within the orbits the sheaths of the optic nerves were distended with blood. When the right eyeball was opened, multiple hemorrhages were seen round the margin of the optic disks, the two largest lying on vessels. Purulent bronchitis and broncho-pneumonia were in the lungs. There was only moderate atheroma, but the left kidney was grossly atrophied and fibrotic, and its pelvis was cystic and projected inwards. There was no abnormality of renal vessels.

Discussing the clinical picture of rupture of a basal aneurysm he said the patient, in many cases, had been said to have good health until the attack, but careful enquiry showed there had been headache, giddiness, defective memory for recent events, etc., also there was usually tinnitus with periodic exacerbations. One of the four patients now dealt with had had periodic attacks of epistaxis, the bleeding having been preceded by lethargy and yawning, with a sensation of heat on the vertex. On the epistaxis commencing he felt very much better and the symptoms disappeared. The onset of the seizure was always sudden. Usually the bursting of the aneurysm synchronised with some form of activity, which for the time raised the blood pressure. The coma into which the patient passed might rapidly become profound, all the signs of cerebral and medullary compression appeared, and he might die within a short time. More characteristic, however, was the clinical picture that, apart from the onset, resembled that of meningitis. Signs of local disturbance of neural function were always present, but, usually, slight. Frequently there were bilateral signs of pyramidal disturbance, such as diminished abdominal reflexes, increased tendon jerks, and an extensor plantar response. An almost constant sign was rigidity of the neck, and Kernig's sign was often positive on both sides. An invariable sign of great importance was the presence of blood in the spinal fluid. With regard to the course of the complaint, recovery from at least the first seizure was common; after two or three weeks there was a return of consciousness, any palsies disappeared, and the reflexes became normal. Sometimes, however, the slight mental defects, such as unreliable memory, remained. But when vitreous or subhyaloid hemorrhage had

occurred, vision seemed to be more or less permanently impaired. One of the cases now narrated had had at least four seizures in 3½ years, and was still alive.

Mr. GOULDEN first entered into a reminder of the intimate anatomy of the parts concerned. With regard to the central vessels of the retina, a branch of the ophthalmic pierced the nerve on its infero-medial surface about 10*mm* from the sclera. It ran for a short distance upon the deep surface of the pial sheath, and gradually reached the center of the nerve, accompanied by the central vein carrying with it a prolongation of the pial sheath. The central vein had the same relations as the central artery, and sometimes opened into the superior ophthalmic vein, though more often directly into the cavernous sinus. The optic nerve, its fibers having lost their myeline sheaths and being correspondingly reduced in volume, pierced the sclera by many perforations, the lamina cribrosa becoming continuous with the retina. At this point the dural sheath bent outwards at an angle of 110° and became continuous with the outer layers of the sclera so intimately that no line of separation was visible. The arachnoid sheath also became continuous with the sclera, the subdural space ending in a cul-de-sac. Likewise the pial sheath, when it reached the sclera, turned outwards and became continuous with the inner layers of the fibres of the sclera; the most internal of the fibres entered into relation with the choroid. He showed a number of instructive slides illustrative of this portion of the thesis.

When considering the ophthalmoscopic signs in cases of hæmorrhage into the optic nerve sheath, they must not be confounded with those changes which resulted from injury to the optic nerve due to fracture at the base of the skull in the neighbourhood of the optic foramen and effusion of blood into the nerve sheath. The cases here discussed were those in which there was no direct injury to the optic nerve by any such object as a spicule of broken bone or any damage to the nerve by a sudden strain or crush. In all the cases which had been followed by a pathological examination the appearances were so similar that a characteristic clinical picture of the fundus could be described. The most common abnormality was papilledema. It was usually bilateral, corresponding to hæmorrhage into both nerve sheaths. It was of

remarkably rapid onset; Uhthoff said he had seen it develop in half an hour, and to be well marked in five hours. The veins were always engorged and tortuous. In most of the cases there were hæmorrhages into the retina, usually small and often near the disk. Vitreous hæmorrhages were said to be rare in the condition, but they occurred in three of the four cases now reported. Disease of the retinal vessels had not been noted in the cases recorded, and in these four cases these vessels seemed healthy. Ophthalmic symptoms were not associated with the cases recorded nor with these four, though this was not remarkable as the patient was overcome by unconsciousness, whether the cause of the subarachnoid hæmorrhage was spontaneous or traumatic. On recovery from the unconsciousness, the patient complained of defective sight, which was great when the vitreous had been full of blood.

The sheath of the nerve, in these cases, was found to be tensely filled with blood clot, which caused the sheath to have the appearance of a distended vein. He reported the result of a microscopical examination of longitudinal sections of the eye. Under a low power, the optic nerve sheath was found to be distended with blood clot, which was most obvious at the anterior extremity of the nerve, where was an ampulliform dilatation of the sheath. A higher power showed there was no infiltration of the nerve itself with blood, but that the blood clot was exactly delimited by the pial sheath. The sclera was not infiltrated with blood, and no corpuscles could be found surrounding the vessels within the nerve. The papilla was slightly swollen. Retinal hæmorrhages could be seen at a considerable distance from the papilla. In traverse sections of the nerve the subarachnoid space was found filled with blood, but the latter did not pass into the pial sheath, and no signs of hæmorrhage could be found within the nerve. The central vessels within the subarachnoid space were full of blood, but it did not pass into the pial sheath.

How, he asked, could the simultaneous appearance of a subarachnoid hæmorrhage be connected with hæmorrhage into the retina or vitreous and the appearance, within a short time, of papilledema? The suggestion could be dismissed that blood found its way into the eye by piercing the pial sheath of the nerve and in that way passing through the lamina

cribrosa into the eye. And it must be remembered that retinal hæmorrhages in these cases were not necessarily at, or even near, the disk. The ophthalmoscopic appearances conformed very much with the prevalent ideas as to venous engorgement of the retina, which was seen in its most marked instance in cases of thrombosis of the central vein of the retina, namely, papilledema, enlarged veins and retinal hæmorrhages. As papilledema occurred so soon, it was obvious that something had occurred within the optic nerve sheath at least soon after the subarachnoid hæmorrhage, and that was assuredly a distention of the sheath of the nerve with blood. Dupuy-Dutemps, Holmes and Paton had shown that when the optic nerve sheath was distended in cases of raised intracranial pressure with papilledema, the lumen of the vein in the subarachnoid space of the nerve was flattened and thus much narrowed. Deutschmann had produced the exact appearance of papilledema in an animal by the direct injection of agar-agar into the optic nerve sheath, thereby causing a prolonged compression of the central vein of the retina in the sub-arachnoid space. Thus the cause of the trouble seemed to be interference with the venous return from the retina and optic nerve.

Mr. LESLIE PATON said that not in all cases of the kind under discussion had papilledema appeared in a few hours; sometimes it did not occur until several days after the onset of the condition. In his paper recently read at the Glasgow meeting of the Ophthalmological Society he called attention to a third type, in which papilledema did not occur until some months after the hæmorrhage; it was the encysted form of hæmorrhage, the hæmatoma acting as a tumor in this respect.

As to the origin of the subhyaloid hæmorrhages in these cases, he agreed with Mr. Goulden that many of the hæmorrhages in the eye in these patients were of the type which could be seen in any form of papilledema. But there were extraordinary cases with a huge sub-hyaloid hæmorrhage without any distension of veins at all, and when the hæmorrhage had sufficiently subsided to allow the disk to be seen again, there were no signs of papilledema. That seemed to strongly suggest there must be some direct continuity of hæmorrhage from the sheath into the subhyaloid tissues.

Dr. Riddoch and Mr. Goulden very briefly replied.

REPORT OF THE ANNUAL CONGRESS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM. (GLASGOW).

By Mr. H. DICKINSON, London.

The Society this year held its three-day Congress at Glasgow University, May 1–3, under the control of the new President, Dr. R. MAITLAND RAMSAY, and it was universally voted a great success.

Sir DONALD MACALISTER, (President of the General Medical Council, London) extended hospitality to the members in a graceful speech of welcome.

Physiology and Pathology of the Pupil Reactions.

Sir JOHN PARSONS opened a discussion on this subject. He said the recent work tended to prove the truth of the theory that the constrictor center was situated near the anterior and inner end of the 3rd nerve nucleus, also that the centre for convergence was on the inner aspect, about at its middle, and that the accommodative fibres were situated at the posterior end of the nucleus. The superior colliculus, he said, had developed in man proprioceptive functions, and that fibres connected it with the vestibule. Possibly it had connection with the pupillary reactions. It was considered that the dilator centre was near the third nerve nucleus, though recent research allocated to it a position higher up. The pupil was in a constant state of unstable equilibrium, and the question bristled.

The Anatomy of the Normal Lens, seen by the Slit-Lamp.

Mr. T. HARRISON BUTLER read a paper on this subject, illustrated by numerous lantern slides. He said the lens was

examined by the slit-lamp chiefly by two methods: with the broad ribbon of light, and with the narrow ribbon, the latter being employed for using the principle of optical section. Examination with the broad ribbon gave further information concerning the various surfaces of the lens as seen from the front, and with regard to the related structures. It was necessary to examine a large number of cases, and by piercing what was seen together, to get a good conception of the whole. He said it was generally very difficult to separate the infantile nucleus. A great mistake, though one frequently made, was to imagine that sclerosis was the same as heightened refractive index. In the lens of the infant the difference between the refractive index of the central part and that of the peripheral part was greater than in the adult. The increased hypermetropia sometimes occurring after 50 years of age was due to a disturbance of balance.

The Trigeminal Nerve as an Integrating Mechanism between the Nose and Eyes.

Dr. Ivy Mackenzie read a paper on this subject, his object being to discuss the anatomical distribution of the 5th nerve from the point of view of its functions as an integrating mechanism in the tissues to which it was related. It was the only sensory nerve in the body which was found in every stage of vertebrate evolution. Its importance became more manifest when one considered the Gasserian ganglion. Besides the branches it gave off to the meninges, it supplied, in its first division, important branches to the internal structures of the eye, and it had an important control over the secretions coming from structures inside the cranium. Experiment had shown that sensory nerves were capable of conveying stimuli from the central nervous system to the periphery, as well as in the contrary direction. A second important point was, that the nucleus of the fifth nerve was the site of stimuli, just as much as the seats of the peripheral distribution. The majority of headaches were due to irritation or intoxication of the trigeminal nucleus. An important feature illustrated in the trigeminal nucleus was the irradiation of stimuli. Sensory nerves produced long systems of collaterals, but in the tri-

geminal nerve there was said to be independent system joining the various parts of the nucleus to each other. When diseased teeth gave rise to eye disease he believed the neural energy, dispersed in the cerebral direction, picked out the eye because of the refinement and delicacy of its structures. Its fluids were probably under the control of the fifth nerve. The control of nutrition had a close relation to painful stimuli.

The Physiology and Pathology of the Pupil Reactions.

Mr. R. FOSTER MOORE described a series of seven cases of what he regarded as a distinct group, owing to the close way in which they simulated the Argyll Robertson pupil. Syphilis had been suspected in several of them. There was an almost complete inaction to light stimulus, a sluggish contraction on convergence after which it slowly relaxed, it was mostly unilateral, and there was integrity of accommodation. In these cases the knee jerks were present, and, even after many years, no sign of nervous disease could be detected. He entered into detail concerning the cases. The pupils of all the cases dilated freely with mydriatics, and the author thought the condition congenital. He suggested for the condition the name "Non-leutic Argyll Robertson pupil."

Central Scotoma in Anterior Uveitis.

Mr. J. GRAY CLEGG read a paper on this subject. He said anterior uveitis or irido-cyclitis revealed itself by the following conditions, though the first was frequently absent: (1) limbal injections (2) deposits of masses of cells on Descemet's membrane, (3) occasional deposits on the anterior capsule of the crystalline lens, (4) synechiæ posteriores, (5) vitreous opacities, (6) punctate anterior choroiditis.

In toxic amblyopia the scotoma was central, and began with the loss of colour sense for green, then for red, then for blue, and, in an aggravated case, for white also. The central acuity of vision was lowered. These results were now mostly regarded as due to changes in the retinal elements. Secondary changes took place in the papillomacular band. When the toxic influence could be removed—by abstention for smoking,

or excessive drinking, or in diabetic patients the elimination of blood sugar—complete recovery ensued, and vision returned to normal. But in anterior uveitis the disease was caused either by the direct action of a microörganism, or, more frequently, by toxins affecting the uveal tissue.

The Pathology of Keratitis Punctata.

Mr. M. S. Mayou, discussing this subject in a paper, said that the rôle played by the lymphocyte and plasma cells in chronic inflammation was not yet understood. Though these cells were non-phagocytic, they presented barriers to the spread of inflammation, both from the local lesion and after the poison had reached the lymphatic glands. The barrier he thought was due to the breaking down of the cells setting free antibodies (leucocydin). The tendency of lymphocyte and plasma cells to run into nodules was well seen in keratitis punctata and other conditions, and it was probable that this massing together of cells was due to an agglutinin body in the aqueous, and he still regarded agglutination as an important factor in the formation of these deposits. Agglutinin caused clumping of bacteria when held in suspension. Red blood cells were found to be agglutinated by such poisons as Ricin, and it was possible that toxic substances might produce an agglutination of comparatively non-amœboid cells, such as lymphocyte and plasma cells. Agglutination was also seen in the granules of pigment from the iris, ciliary body, or choroid which had made their way forward into the anterior chamber. Possibly this might be due to the electrical condition of the particles.

Early Capsular Discission after Operations for Senile Cataract.

Mr. W. B. Inglis Pollock, in setting out the advantages of this operation, said that for three years he had, whenever possible, carried out his cataract extractions without doing iridectomy, because then the patient was left with a round and mobile pupil. The sphincter pupillæ was untouched, and its subsequent activity provided a safeguard against the onset of glaucoma. Moreover, it was almost impossible for strands of the capsule of the lens, or portions of the vitreous body, to be

left entangled in the lips of the wound. But if the lens was not fully mature, the parts remaining attached to the capsule became swollen and opaque, and passed into the pupillary area on the second or third day after operation. Usually they dissolved, and by the 15th day the pupil was much clearer. He described his operative procedure in detail. He said he had found that most of the cases with iritis had septic teeth, and when the latter were removed, the iritis subsided. When division of the capsule was undertaken late it was calcareous, and great tension was required in dividing it. By following the procedure he described, he said, the patient was spared a secondary cataract operation; and he claimed that the operation gave the advantages of intra-capsular operations without their dangers.

An Operation for Glaucoma when Iridectomy Fails.

Dr. G. F. ALEXANDER offered a suggestion for dealing with cases in which iridectomy failed, with the object of facilitating escape of aqueous by freely opening the section subscapularly, so that it might be into Tenon's lymph space. He considered that if, after a time, fibrous tissue formation in the section were to render the percolation insufficient, a repetition of the operation would permanently remove this tendency. The section for the iridectomy should be behind the cornea, and might with advantage be made with a narrow Graefe knife, and accompanied by the making of a conjunctival flap. As, after this operation, the escape of the aqueous was linear the covering tended to be flat, and as it consisted both conjunctiva and the capsule of Tenon, the risk of infection was minimal.

Some Ocular Signs in Subarachnoid Hæmorrhage.

Mr. LESLIE PATON, in the course of an exhaustive thesis, dealt with the ocular complications met with when an aneurysm ruptured in one of the arteries of the brain and produced a subarachnoid hæmorrhage. Incidentally, he referred to traumatic hæmorrhages, especially those resulting from fractures of the base of the skull. The effects of traumatic hæmorrhages he said, differed in many ways from those produced by spon-

taneous or non-traumatic hæmorrhage. Some of the eye symptoms might be the result of the fracture, not of the subsequent hæmorrhage. The source of the subdural sheath hæmorrhage in traumatic cases might be rupture of the small dural vessels in the optic foramen.

Subdural hæmorrhages might occur in various vascular and blood diseases, such as scurvy, hæmophilia, various anæmias, alcoholism, etc., and retinal changes might be found in any of these.

The main cause of spontaneous subarachnoid hæmorrhage was rupture of an aneurysm in one of the basal arteries. The aneurysm might be either congenital or acquired, the former being the more frequent, "congenital" meaning not necessarily that the aneurysm was present at birth, but that there was a congenital weakness of vessel walls which made the later development of aneurysm easy. The most frequent site for these aneurysms was the anterior half of the circle of Willis. Probably very little effect was produced by an unruptured basal aneurysm. Oculo-motor disturbances were by far the most frequent results of aneurysmal rupture; they occurred in about 70% of all cases, and the third nerve was the most frequently affected. The occurrence of retinal hæmorrhages apart from papillœdema might be due to local disease of the arteries, similar to the lesion responsible for the intracranial bleeding, or these hæmorrhages might result from such blood conditions as scurvy or anæmia. Some of them, he thought, were due to leakage of blood through the subpial lymph spaces around the lamina cribrosa, and through the perivascular lymph spaces round the central vessels.

Iridectomy in Congenital Cataract.

Mr. J. ROWAN (Glasgow), in a paper on this subject, said he had come to the conclusion that if there was a clear bit of lens, or if a clear bit of lens could be brought into use after an iridectomy, then iridectomy was preferable to needling. If, however, the lens was quite opaque, the question of iridectomy was not raised. The position of choice for the iridectomy was down and in. He had never seen these cataracts increase in after years. A great advantage was that the

patient could go about his ordinary work without spectacles, whereas if needling were done, the patient had to wear glasses for his work, and also for reading. Before deciding on the operation for a particular case he tested the patient with undilated pupils, and if the distant vision was better with dilated than with contracted pupils and if part of the lens was clear, he always did an iridectomy, as small a one as possible.

Advantages of Strong Atropin in Cataract Removal.

Dr. G. F. ALEXANDER said, in a paper on this subject, that in the absence of synechiæ, the extent of the dilatation given to the pupil varied directly with the strength of the solution; but it seemed to vary inversely with the degree to which the patient was the subject of arteriosclerosis, rather than with the actual age. Sometimes the usual strength of atropin failed in its purpose, and he had found that by placing a small drop of a 5% solution in the outer limit of the lower fornix an hour before the operation, the pupil was dilated to its maximum extent at the time of operation, prevented contraction on the escape of aqueous, and the dilatation was maintained for several days after the operation, in addition to there being immunity from toxæmia. He related a number of other advantages from the practice.

Relapsing Traumatic Keratitis.

Mr. SPENCE MEIGHAN read a paper entitled **Two Cases of relapsing traumatic keratitis.** They were the only two cases of the kind he had met with in seven years' experience.

The first patient attended because he felt something enter his eye while in the factory. No foreign body could be seen, but the ambulance attendant at the works scraped the cornea. Three days later a corneal ulcer was present. In a fortnight the eye was watering and was irritable, and there was circumcorneal injection. Tension, judged by the finger, appeared normal. A week later he had developed a vesicular condition over the lower half of the cornea. The treatment applied consisted of boric acid solution, atropine drops, and yellow oxide ointment. Tension increased, and he was admitted to

the infirmary, where paracentesis, and, later, iridectomy were performed. After the latter there was much hæmorrhage into the anterior chamber. The general condition improved after this, though the vesicles persisted. The epithelium was easily removed by cotton wool on a probe, and the cornea was clear beneath. A conjunctival flap was made to cover the whole denuded area of the cornea, yet the eye remained irritable, and pain now became a prominent feature. A spot of pigment appeared, and the condition became worse. Excision was carried out.

Microscopical examination, carried out by Dr. Marshall, showed a patchy interstitial infiltration of the cornea; the epithelium was detached from the central part. There was considerable infiltration of the subconjunctival tissues of the limbus; there was a well-marked keratitis punctata on the lower half of the cornea. Also there was a well-marked uveitis, and the iris and anterior part of the ciliary body were infiltrated with plasma cells.

The second patient had been struck by a splinter of glass following the breaking of a beer bottle, resulting in an extensive wound of the cornea. The attempt to remove the spicule of glass was unsuccessful, as it was really a split in the substantia propria of the cornea. The cornea healed without complication. Fifteen months later he was seen again, the history being that the eye had remained well until six months before, since when he had begun to lose the sight in the eye, and the eye was now watery and tender. In spite of continued treatment, the eye still failed to recover at the time of reporting.

Eye Symptoms in Early Diagnosis of Disseminated Sclerosis.

Mr. BROWNLOW RIDDELL in this communication gave some interesting notes of cases of disseminated sclerosis which had been seen by him when no organic change was suspected, in order to draw attention to the importance of eye symptoms in an early recognition of the disease.

One case had mild retro-bulbar neuritis, the nature of which was not appreciated until, much later, the patient had the same affection in the other eye, and in due course the diagno-

sis became obvious. Another subject of the disease had first only diplopia of three weeks duration. Similar cases which could not be otherwise explained should be kept under careful observation, the possibility of disseminated sclerosis developing later being kept constantly in mind. Though the immediate prognosis of retro-bulbar neuritis was good, in a certain proportion a second attack developed at some future date, and then some organic disease of the central nervous system became manifest. He related a number of cases bearing on his thesis. These patients were not old, their affection ran a chronic course, and they were quite able to contract various diseases which ended fatally, hence the condition, often, was not diagnosed. He urged thorough anti-syphilitic treatment from the earliest stage at which the particular patient was seen.

REPORT OF THE OXFORD OPHTHALMOLOGICAL CONGRESS.

By B. CRIDLAND, Wolverhampton.

Under the Mastership of Sir Anderson Critchett, Bart., K.C.V.O., the Oxford Ophthalmological Congress held its fifteenth annual meeting at Oxford on July 2nd, 3rd, 4th, and 5th.

With a membership of 380 the expectation that it would be well attended was realized for the number closely approached that of last year which stands as a record.

The proceedings were held as before in the Department of Human Anatomy through the kindness of Professor Arthur Thomson, whilst the hospitality of Keble College was again available for board and lodging.

On July 3rd, the Congress was opened by the Master with an address of welcome in which after witty allusions to the programme, he expressed pleasure at the presence of Dr. E. Landolt of Paris and Dr. G. de Schweinitz with others from America.

This was followed by a discussion on **The General Principles of the Treatment of Convergent Concomitant Strabismus** (excluding the description of details of operations) the openers being Dr. E. Landolt of Paris and Dr. Ernest Thomson of Stirling.

Dr. G. E. de Schweinitz (Philadelphia), Dr. T. Harrison Butler (Birmingham), Mr. R. Beatson Hird (Birmingham), Mr. Ernest Clarke (London), Mr. A. F. MacCallan, C.B.E. (London), Mr. Claud Worth (London), Mr. Angus MacGillivray (Dundee), Dr. Stewart Barrie (Glasgow), Dr. Marion Gilchrist (Glasgow), contributed to the Dis-

cussion. In the afternoon demonstrations were given in the Scientific Museum by the following:

Dr. GEORGE YOUNG (Colchester) who described his operation of double sclerotomy by trephining without communication with the anterior chamber and showed a specimen illustrating the success of the procedure.

Dr. RAYNER BATTEN (London) showed with the epidiascope a valuable collection of drawings of fundi from cases of cardio-vascular disease, macular, cerebro-macular and congential diseases with a number of others unclassified.

He also demonstrated models of fundus conditions, the Hydrophthalmoscope, special rigid spectacles for ptosis with a case showing their value, a fixation fork for the insertion of sutures in advancements and tension experiments with balloons.

Dr. THOMSON HENDERSON (Nottingham) showed a good series of pathological sections including a number to illustrate the evolution of ciliary muscle in mammalis.

Dr. H. M. TRAQUAIR (Edinburgh) gave a demonstration of his method of perimetry.

Mr. J. H. TOMLINSON, M.D. (London), showed (1) Pulfrich's illusion, (2) Independence of color perception of the two eyes, (3) Summation of brilliance value of the two eyes.

Mr. A. H. MACCALLAN, C.B.E. (London), gave a short account of the treatment of trachoma.

Mr. P. H. ADAMS showed some interesting specimens of secondary carcinoma of the choroid and other conditions.

Dr. HARRISON BUTLER (Birmingham) demonstrated Hess's apparatus for the investigation of muscle paresis, and Mr. ARTHUR GREENE (Norwich) showed a pair of double scissors for use in lengthening of muscles by partial section.

In the Commercial Museum fourteen firms of ophthalmic instrument makers exhibited models of the newest appliances and apparatus used in ophthalmic work whilst an exhibit which attracted a good deal of attention was that of the manufacture of artificial eyes, in which the process could be followed from the beginning to the finished product.

On Friday morning Dr. HOWARD F. HANSELL (Philadelphia) opened the session with a paper describing four cases of **atypical retinitis pigmentosa** associated with developmental

abnormalities and occurring in members of one family, and was followed by Professor H. FRIEDENWALD (Baltimore) who dealt in an interesting contribution with the relationship between chorio-retinitis-Juxtapapillaris (Jensen's disease) to other forms of chorio-retinitis. After a short interval Dr. T. HARRISON BUTLER (Birmingham) delivered the Doyne Memorial Lecture, his subject being **Focal Illumination of the Eye with Special Reference to the Clinical Use of the Gullstrand Slit-Lamp.**

As a pioneer in the subject in this country the Lecture was closely followed, much interest being shown in the admirable series of original pictures illustrating various pathological conditions as seen with the corneal microscope and the slit-lamp. At the close Dr. BUTLER was presented by the MASTER with the Doyne Memorial Medal.

The morning session closed with a short address by Dr. PARK LEWIS on **Preventive Ophthalmology as an Organized Movement** in which he urged the value of international co-operation in the subject.

The afternoon session was held at the Eye Hospital where a demonstration of the corneal microscope and Gullstrand Slit-Lamp was held under the direction of Dr. HARRISON BUTLER assisted by Mr. R. J. COULTER and Mr. B. CRIDLAND.

Four instruments were in use and a good number of patients were available for examination through the help of the Deputy Master, Mr. P. H. ADAMS.

On Saturday morning a paper was read by Mr. H. HOLMES JOY, O.B.E., K.C., dealing with such legal matters and procedure as might especially concern the medical man in general and the ophthalmic surgeon in particular.

Containing much useful advice to the expert medical witness and the specialist medical referee the paper was well received, and greatly appreciated by a good audience.

In conclusion Mr. JOY raised the question as to whether one attack of coal-miners' nystagmus gave rise to an increased susceptibility to future attacks and stated that it would be of considerable assistance with regard to compensation cases under the W. C. Act if some unanimity of opinion could be expressed by the Congress upon the point.

A good discussion followed in which the following took part:

Messrs. C. F. HARFORD, ARTHUR GREENE, B. CRIDLAND, Colonel A. H. TUBBY, Messrs. R. J. COULTER, R. JAQUES, G. H. POOLEY, E. PARK LEWIS, A. S. PERCIVAL, ANGUS MACGILLIVRAY and LISTER LLEWELLYN.

On the afternoon of Thursday the 3rd a garden party had been arranged in the Gardens of University College but owing to the weather the members of the Congress and their friends were received in the Hall of the College, Dr. AINLEY WALKER, Dean of the Medical Faculty of the University, and Mrs. Walker acting as host and hostess.

The Annual Dinner of the Congress was held on the same day in the Hall of Keble College and was well attended, amongst those present being Sir T. HERBERT WARREN, the President of Magdalen College, Dr. AINLEY WALKER, Dr. DE SCHWEINITZ, Sir GEORGE BERRY, Dr. GIBSON, Dr. HOWARD F. HANSELL, Dr. PARK LEWIS, Professor FRIEDENWALD and others.

No meeting of the Congress will take place in 1925 on account of the Convention of English-Speaking Ophthalmological societies which will be held in London in July of that year.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. DAVID H. WEBSTER, Secretary.

MEETING OF MARCH 17, 1924. DR. BEN WITT KEY, CHAIRMAN.

Dr. Julius Wolff reported a case of **Lymphomatosis of the Conjunctiva,** in a man, aged 50, transferred from the medical service of Bellevue Hospital to the eye service on January 30, 1924. The family history has no bearing on the case. The patient on October 26, 1923, stated that he has for a long time been subject to glandular enlargements, which, however, subsided.

Since last June, glands on the right side of the neck have been growing progressively. In August the eyes began to tear and to secrete a mucoid discharge. Three weeks later at an eye hospital some tissue was removed for examination. When admitted the findings were: marked purulent conjunctivitis, with swelling of the lids and some tendency of the latter to avert. There were large lymphnodes in the submaxillary region and along the sides of the neck. The liver and spleen were slightly enlarged. Inguinal and axillary glands also enlarged. The blood examination showed: Red blood cells, 4,500,000; White blood cells, 14,700; hemoglobin, 76%.

The differential count showed: polynuclears, 9%; large mononuclears, 81%; small lymphocytes, 8%; transitionals, 2%. The medical diagnosis was that of an atypical leukemia. The eye examination at that time showed lids, swollen and œdematous; conjunctiva, very much hypertrophied with large follicles in the upper and lower fornices, which were thrown into several parallel folds. The tarsi were thickened and cov-

ered with many granulations. When the lids were everted they remained so until replaced. There was a profuse, thick purulent secretion in both eyes. The corneæ, irides and fundi were normal. On November 1st, a small portion of conjunctival tissue was removed for examination, and showed diffuse hyperplasia of lymphoid cells, confirmatory of the diagnosis of lymphatic leukemia. While still on the medical service, X-Ray treatment was given to the enlarged glands and several blood examinations showed results varying only slightly from the above.

Dr. WOLFF first saw the patient on February 7th. The eye condition was then as above described, but in addition a large doughy and tender swelling, rather sharply outlined, had developed at the inner part of each lower lid. Under daily treatment with nitrate of silver and irrigations, the purulent discharge gradually subsided, and the lymphatic swelling of the conjunctiva diminished somewhat. The swellings in the lower lids were incised and found to contain the same thick, creamy pus that was discharged from the conjunctiva. A fluid irrigated through the canaliculi came out through the incisions, showing that the abscesses connected with the tear sacs; it is, therefore, safe to assume that the same lymphatic swelling, visible in the conjunctiva, also involved the mucous membrane of the lacrimal sacs.

Dr. BEN WITT KEY reported a case of **Bazin's Disease** associated with ocular manifestations.

A girl, aged 18 years, of American parentage, complained of recurring attacks of phlyctenular conjunctivitis with pustule in the center of each cornea, and in the left eye a ribband shaped keratitis. She was of the delicate type, a light blond, angular and tall. Besides being underweight and sick as a child, she had had a serious lung involvement from the ages of four to eight. At eight years of age her eyes became inflamed, and recurring attacks of phlyctenular conjunctivitis with corneal pustules had persisted from time to time, now over a period of ten years.

Three years ago, during a violent attack of phlyctenular kerato-conjunctivitis, she complained of "lumps" forming on the calves of her legs, which finally came to the surface and formed brownish copper-colored ulcerations. Although

the Wassermann and other laboratory tests were negative, she was placed on anti-luetic treatment. There was a temporary improvement in her condition. Continued recurrence of the ocular and skin lesions led to a tuberculin test which gave a positive local and general reaction. Tuberculin treatment definitely relieved her symptoms, so that her eyes became entirely quiet.

The skin lesions proved to be those of Bazin's disease, a rare disease affecting cachectic or tuberculous girls and women between the ages of twelve and thirty years, and characterized by indolent, deep seated gumma-like nodules occurring usually on the backs and sides of the calves of the legs. It is to be differentiated from syphilitic gummata and from erythema nodosum.

Dr. J. M. ROBISON read a paper on **Nerve Block Infiltration Anesthesia** which appears in full in this issue.

DR. J. T. GWATHMEY read a paper on **General Anesthesia in Ophthalmic Practice,** showing the great advantage of preliminary medication, especially where anesthesia has to be maintained over a long period as in plastic surgery. The article appears in full in this issue.

DISCUSSION: Dr. SMITH requested Dr. Robison to draw a diagram explaining the points at which he made his injections. Dr. KIRBY: We have used the Gwathmey colonic ether technique in about twelve cases on which Dr. J. M. Wheeler performed plastic operations about the eyes. The youngest patient was 11 years, the oldest 46 years. They were all excellent surgical risks, except one case of hyperthyroidism and one of chronic interstitial nephritis. We followed the technique of the originator of the method closely, and in no case did we experience any untoward effects. The anesthesia was excellent, the greater number of the cases being completely relaxed. The cardio-respiratory system was not embarrassed. In no case was there any sign of danger. The advantage of the method lay not in increased safety but in the convenience of not having the inhalation apparatus about the face. Dr. KEY saw Dr. Green use the method of deep orbital injection of 2*cc* of the Metz solution with satisfactory results. Dr. WHEELER: In prolonged plastic cases we find colonic anesthesia is the method of choice, in shorter cases we

use 2% novocaine with a preliminary injection of morphine and atropin. In infiltrating scar tissue it is necessary to use a dental syringe. Dr. Wheeler emphasized two points: (1) That in doing plastic surgery novocaine does not interfere with the taking of the graft. (2) Novocaine should be fresh. He had had four cases with granulations simulating new growth following the use of stale novocaine. The employment of ointment is always advisable to prevent the disturbances of the cornea following the paralysis of the lids. Dr. IRWIN: I have had to suture two of my cases in which the lids could not be closed following infiltration. Dr. MAY: The advantages claimed for butyn are not borne out. There have been three deaths from the subcutaneous injections of butyn. I have compared holocaine and butyn, and find the latter has no advantages over the holocaine. Dr. Mayer of Chicago, one of the committee of the A.M.A. states that novocaine has proven to be absolutely harmless. Dr. BERENS: I saw two cases of butyn-idiosyncrasy in the form of a local congestion, not the usual hyperæmia, but a distinct irritation. Dr. KEY: I am glad to learn that novocaine does not produce any injurious result at any time, as I have used 4% in deep injections. I would like to ask a question: Has anyone seen similar irritations as seen by Dr. Berens? Dr. GWATHMEY: I have used my method in patients from 6 to 70 years in age, in cases of nephritis, and find it very safe and easy.

MEETING OF APRIL 21, 1924. BEN WITT KEY, M. D., CHAIRMAN

Dr. ARNOLD KNAPP presented a patient who had been operated on for **Osteoma of the Orbit.** A full report of this case will appear.

Dr. Knapp presented a case of **Intra-Orbital Foreign Body** successfully **removed** by a **Krönlein operation.** The patient, a boy, aged 10, put a cartridge in the fire, it exploded and he was struck in the outer part of the right upper lid. When he came to the hospital on the same day, March 24, 1924, the right upper lid was swollen, there was an irregular wound in the lid, some exophthalmos, pupil dilated, no vision, fundus showed large retinal hemorrhages. X-Ray revealed irregular shaped foreign body in orbit back of the eye close to the outer

bony wall. As the inflammatory symptoms were increasing, the attempt to remove foreign body seemed necessary. The outer wall was resected by the Krönlein procedure and on reflecting the periosteum an irregular tear was present in the membrane just back of the attachment to the orbital margin. The wound in the periosteum was enlarged posteriorly and after a little searching the foreign body was located and extracted. Bone flap replaced, wound closed. Primary union; bone in place, mobility normal. Vision $\frac{18}{18}$. Fundus showed an irregular rupture of the choroid in the external periphery and some retinal hemorrhages. The foreign body was brass, irregularly flat, 11 x 5*mm* in size.

Dr. KNAPP demonstrated the Hartley-Kenyon portable electric motor with a circular saw which is best adapted to resect the outer bony wall of the orbit in this operation. In discussing the second case Dr. BLAKE asked if the removal of the foreign body would be indicated if the eye was blind. In reply Dr. KNAPP stated that one had to be governed by the character of the foreign body, and the degree of reaction, brass and copper being most prone to produce inflammation.

Dr. C. E. MCDANNALD presented a case of **Malignant Melanoma of the Lid** in a woman 28 years old who was first seen December 22nd, 1923.

A year before coming to the clinic she noticed a small pigmented spot in the centre of the right upper lid, situated at the ciliary margin. There had been a gradual increase in the size of the growth until it measured 3.5 by 5*mm*. It was a dark, slate color and involved the margin of the lid, extending upwards 3.5*mm* on the skin surface and 1*mm* up on the conjunctival surface. A tentative diagnosis of melanosarcoma was made and its removal advised. The patient was sent to the Memorial Hospital for an opinion on the proper method of procedure. Dr. Quick expressed himself rather in favor of radium as he thought excision would necessitate practically a complete ablation of the entire upper lid. However, Dr. McDannald determined to attack it surgically and on February 19, 1924, removed the growth including 5*mm* of the skin muscle, tarsus and conjunctiva from the center of the lid. The result is most satisfactory, the lid being normal in appearance. It is of course too soon to say whether or not

there will be a recurrence. Professor James Ewing was kind enough to look at the microscopic section and said he was not willing to call it a sarcoma but preferred to classify it as malignant melanoma. Vision O.D. $\frac{20}{30}$, O.S. $\frac{20}{20}$.

Dr. C. E. McDANNALD presented a case of **Epibulbar Melano-Sarcoma,** a man 47 years old, seen first October 21st, 1922. Four years before he noticed a pigmented spot on the inner border of the cornea in the right eye. It remained quite stationary until four months before the patient came to the clinic at which time he took a position in a factory where he was exposed to a great deal of dust. Then it commenced to grow rapidly.

There was a large, elevated mushroom-shaped, pigmented mass, starting from the limbus and overlying the nasal fifth of the cornea. Under the slit-lamp some large sub-conjunctival blood vessels led up to the mass and disappeared. Pigmented cells could be seen in the overlying conjunctiva and below the limbus attachment. The growth was lobulated, pigmented and ramified with blood vessels. The eye was normal in every other respect, with $\frac{20}{20}$ vision. Patient entered New York Eye and Ear Infirmary October 24, 1922. After consulting with Doctors J. E. Weeks and R. G. Reese, it was decided to remove the growth rather than enucleate the eye and subject the area to radium. The growth was easily excised in about the same way one would remove a pterygium, with a thorough curettement of the limbus. Five days after operation the stitches were removed, resulting in some gaping of the wound. There was, however, no delayed healing. After this was complete he was sent to Dr. John Remer who made three radium exposures along the site of excision: November 3, 1922, December 4, 1922, and January 13, 1923. He employed a twenty-five tube of unfiltered radium for ten minutes. Since that time this patient has been under monthly observation without any evidence of return of situ and so far as can be determined there is no metastasis.

DISCUSSION: Dr. KNAPP said that it was Panas who first called attention to the fact that these cases were not as malignant as ordinarily supposed, and that this case substantiates that opinion.

Dr. JOHN M. WHEELER presented a case of **Lymphangiosarcoma** of the right upper lid. Six months ago the patient noticed a small lump in the right eyelid. This had grown gradually and had been incised once. No radium or X-Ray had been applied. The Wassermann test was negative. The right eyelid presented an indurated lesion 15 by 33*mm* in size with its center about over the external canthus. It was about 10*mm* thick at the center. There was a craterform surface with scab formation. It was freely movable. There were no enlarged preauricular, sub-maxillary, cervical or other lymph glands. The liver, spleen, heart and lungs were negative.

On January 17th, the tumor was removed by excision with the least possible traumatism and a true skin graft was taken from the left upper lid and placed in the right upper lid. One intermarginal adhesion was made. The graft was a complete take and there is no deformity of either upper lid.

The pathological report from Dr. Ward J. MacNeal was as follows: "Along one surface there is an ulcer covered with fibrinous exudate. Beneath this is a highly cellular tissue, made up of polymorphous cells with rather large nuclei only moderately rich in chromatin and possessing very little fibrillar stroma. In many places these cells tend to group themselves about a small lumen, usually a lymph channel but sometimes containing blood. Mitotic division figures are present in moderate numbers in these cells. They appear to be of endothelial origin, probably from the endothelial lining of lymph vessels. At its base the neoplasm is not sharply demarcated from the striped muscles and the adjacent muscle fibres are degenerating. DIAGNOSIS: Lymphangioblastic endothelioma (lymphangiosarcoma). Such a new growth is only moderately malignant. Local recurrence is to be looked for. There is no immediate danger of metastasis."

DISCUSSION: Dr. DAVIS: How long was the skin graft? Dr. WHEELER: About one inch.

Dr. WALTER E. WEIDLER presented a case of **Teratoma of the Orbit.** The patient, male, aged 50, has had a slowly growing swelling in the upper part of the left orbit for six years. There was gradual increasing exophthalmos with limitation of motion and partial loss of vision. The right eye is normal with $\frac{20}{20}$ vision. The left eye shows slight engage-

ment of the vessels of the lids and globe. There is a large sloughing ulcer of the lower two-thirds of the cornea, due to exposure. Vision: counting of fingers at eighteen inches. The eye is pushed down and out and there is a hard, dense mass in the upper, outer part of the orbit. The tumor is smooth and round and can be very readily palpated but it is not movable under the fingers. X-ray of orbit and sinuses negative. Wassermann negative.

OPERATION: A Krönlein operation was done under general anesthetic and a large tumor mass measuring 23 x 22 x 20*mm* was removed from the upper, outer part of the orbit. The tumor mass was found free in the orbital tissues and was easily shelled out of the orbit by the fingers. The lacrimal gland was also removed at this time because of the opinion that the tumor may have originated from the glandular tissue. Subsequent study of the tumor showed this to be correct. The wound was closed with silk sutures. There was a very slight degree of reaction of the orbital tissues; the patient was discharged two weeks after the operation. The corneal ulceration had healed and the eye returned to the orbit with return of normal movements. Vision at this time $\frac{15}{200}$.

Dr. ANDREW EGGSTON reported that the specimen consists of a firm nodular tumor mass measuring 23 x 22 x 20*mm*. Upon gross section the cut surface appears trabeculated and presents several small, grayish-white areas. Microscopic section shows tumor to consist of myomatous tissue and connective tissue which in areas show cartilage metaplasia. The connective tissue structures surround glandular tissue. Some of the glands show simple cuboidal epithelium while others show considerable epithelial hyperplasia. No mitotic nuclei are evident. In some areas there is lymphocytic infiltration. Diagnosis: Mixed tumor of lacrimal gland (Teratoma).

DISCUSSION: Dr. CURTIN saw this case before operation, and thought that the tumor mass came from the lacrimal gland, and was of the opinion that it was a sarcoma.

Dr. A. E. DAVIS presented a case of **Malignant Goitre,** in a man aged 64, who came under his care in July, 1911. He had been under mental strain for a number of years because of an insane wife. No history of goitre in the family, and the

present prominence of the eyes began in the last year. No enlargement of the thyroid gland and pulse regular but a little rapid, ranging in the eighties.

R.V. $\frac{20}{70}$: $\frac{20}{15}$ w plus 0.75 plus 0.50 C75
L.V. $\frac{20}{100}$: $\frac{20}{40}$ plus w plus 2.75 plus 0.75 C110

Normal fundi. Patient was seen again in January, 1923, vision remained $\frac{20}{15}$ right and $\frac{20}{100}$ left, with correction. At this time the eyes were decidedly prominent with marked enlargement and tortuosity of the veins on the temporal half of each eye. The eyes had the typical stare but the lids were easily closed and there was no limitation of movements of the eyeballs. No enlargement of thyroid, and pulse about 85–90. Central scotoma left eye 5° in diameter, slight pallor of temporal half of the disk. Present condition, April 1924, R.V. $\frac{20}{70}$ with correction — L.V. fingers at two feet, not improved; absolute central scotoma left, 10°; central scotoma for red, 5° right (patient had not overindulged in tobacco or drink). Peripheral fields normal, pallor of temporal half each optic disk. The eyes are protruding, though the lids can be closed and there is no ulceration of the corneæ; motility is limited, especially upward and downward, no diplopia. There are large masses of enlarged tortuous veins in the conjunctiva, temporal half of each eye, though no œdema of lids. No enlargement of thyroid, slight muscle tremor, no tachycardia, pulse 92, blood pressure $\frac{170}{130}$. Basal metabolism 13% above the normal. Sugar tolerance 0 point 1—0 point 2—0 point 1–5. In this patient the exophthalmos has been slowly progressing, but steadily; and what is somewhat rare in such cases, he has fundus lesions. We know that in acute or subacute cases of exophthalmic goitre with marked protrusion and attended with œdema of the lids and corneal ulceration, that finally a true hyperplasia of the tissue in the orbit occurs, with marked enlargement of the blood vessels. Dr. Davis presented this patient to have the opinion of the members of this Society as to the advisability of operative procedure. The patient is slowly going blind, and some decisive measure must be taken.

DISCUSSION: Dr. WEIDLER said there seems to be some

solid growth preventing the eyes from being pressed back, and suggests that in view of the loss of vision, a Krönlein might be done.

Dr. ELBERT S. SHERMAN presented a case **of Intra-Ocular Foreign Body,** lodged in the sclera at the edge of the optic nerve. The giant magnet failed; panophthalmitis developed; the eye was enucleated. Dr. Sherman presented this case as illustrating some of the magnet failures.

DISCUSSION: Dr. MCDANNALD asked if any one had seen a case of sympathy due to a piece of steel in the optic nerve?

Dr. BEN WITT KEY presented a case of **Traumatic Pulsating Exophthalmos** in a man, aged 29 years who was first seen on March 28th, 1924, complaining of dizziness, pulsating noise in the head, marked protrusion of the right eye, and pain and inflammation of both eyes.

He gave a history of injury on September 11th, 1922, when he was crushed between two trolley cars, receiving a fracture of the three left lower ribs, right clavicle, and base of skull, and being rendered unconscious for two days. He was five weeks in the hospital, during which time he complained of diplopia, the sight in the right eye diminished to fingers at a few feet. On December 5th, 1922 an operation (iridectomy) was performed on the right eye for acute glaucoma. At this time there was only very moderate exophthalmos, but two days after the operation the exophthalmos increased perceptibly; the eye became very tender; there was marked chemosis, and the anterior chamber filled with blood. Three weeks after the operation swelling of the lids and protrusion of the globe with pulsation in the orbit gradually increased, which condition he now presents. Two days after injury a throbbing noise in the right side of the head was noted and four weeks afterwards shifted to the left side also.

On examination the face of the patient appears cyanotic and swollen, especially about both eyes and over the bridge of the nose—extending well upon the forehead. The right eye is greatly protruded and deviated slightly downwards and outward, Hertel's exophthalmometer measuring 27*mm*, the left 12 *mm*. Large pulsating veins, including the supra-orbital, frontal, nasal and the angular, and their anastomosing branches to the left side of the face, are prominently displayed,

that of the right supraorbital vein being the most conspicuous. To palpation these varices pulsate, as does the globe, with each rush of arterial blood and a distinct thrill is felt synchronous with the bruit. The conjunctiva is cyanotic, the large superficial veins engorged and tortuous, but no edema and no deep injection. The cornea is clear and transparent; anterior chamber normally deep; a large clean cut coloboma of the iris is present above the site of operation for glaucoma. The aqueous, lens and vitreous are clear. The fundus picture is that of true papilledema and adjacent chorio-retinal edema, marked arterial and venous engorgement, with numerous small hemorrhages scattered throughout the fundus. Several whitish spots (exudates) are seen in the juxta-papillary region. The macular area is congested and edematous. Vision—fingers at three feet. The intra-ocular tenson of this eye has been normal, no miotics being used at any time. The left eye shows swollen lids, with pulsating varices about the orbit, especially involving the angular and frontal veins and branches. There is no measurable exophthalmos, the conjunctiva is very slightly-injected, but otherwise the anterior segment of the eye appears normal in every respect. The fundus is moderately congested but otherwise normal. Vision $\frac{10}{10}$. A loud bruit is audible over all portions of the head, perhaps most accentuated over the right orbital region. Digital pressure over the common carotid artery causes cessation of the bruit.

An X-ray report (Dr. George Dixon), dated December 4th, 1923, read as follows: "In the lateral view there is a suspicious line on the right side running upward and a little backward from a point about $\frac{2}{3}$ the distance to the vertex. The line divides anteriorly extending straight upward. The posterior line runs in a more backward direction toward the depression in the region of the upper margin of the occiput."

The patient is now receiving injections of 4*cc* of 4% bactogelatin every three days. Digital pressure has been employed, and for the past seven days at intervals a pressure clamp upon the carotid has been worn. The latter can be tolerated only for a time, when it must be removed, because of laryngeal disturbance, pain, etc.

The question of ligation of the pulsating veins at the inner angle of the orbit with excision of the varices is now being considered because it is an operation of little gravity and is advocated by Noyes, Golobin, Buchtel, Katz, Lystad, de Schweinitz, and many others. It is a measure frequently curative, and even when the more serious operation of ligation of the common carotid has failed.

The interesting features of this case report are as follows: (1) The intermittent slow course over a period of one year and seven months; (2) The prominent orbital and facial pulsating varices, which is rare; (3) The question of glaucoma, a condition rarely reported as a complication in these cases, and which has not been observed in this case to date; (4) The interesting fundus picture, and the absence of marked brain symptoms, which would seem to indicate principally an orbital involvement; and therefore, (5) The advisability of first performing excision of the pulsating orbital varices, before resorting to gradual ligation of the common carotid.

DISCUSSION: Dr. KNAPP thought this would be a suitable case for ligation of the ophthalmic vein; he called attention to the fact that glaucoma is usually stated as one of the causes of loss of sight in these cases. Dr. WHEELER had a similar case which became unconscious on the table, and died 39 hours after ligation of the carotid. Dr. BURKE of Washington stated that Dr. Wilmer had a similar case, the carotid being ligated in two stages, there was very little disturbance. Dr. KEY thinks that the fundus picture in this case rules out glaucoma as a factor for producing loss of sight.

VI.—**Atlas der Histopathologie des Auges** (*Atlas of the Histopathology of the Eye*). 191 colored drawings on 44 plates with 88 pages of Text, Table of Contents and Glossary, with an Introduction by PROF. ERNST FUCHS. By PRIVAT DOZENT ADALBERT FUCHS, University of Vienna. Franz Deuticke, Leipsic and Vienna, 1924.

The foreword of this very interesting volume by the father of the author, Dr. Ernst Fuchs, aptly expresses the predominating and distinctive features of this work. The innovation of using colored plates by way of illustrations cannot but be greatly appreciated by the advanced student of ophthalmology. Likewise the use of good English in the text will doubtless help very greatly in obtaining a large circulation of a work so authoritative in character. To those of us who had the privilege and pleasure of listening to the lectures of Dr. Ernst Fuchs, both here and abroad, the volume will be extremely refreshing and reminiscent. The stained sections seem to have permitted reproduction very well indeed. The elementary pathological changes are especially well shown, and would appear to admit of screen reproduction by any of the reflecting projectors for class demonstration very readily. The corneal conditions are particularly good. The pictures of the corneal conditions will help very much to console those whose results in bad cases have left something to be desired. The pathology herein shown will explain the limitations of our therapy in many cases. It is very likely that the usefulness of these plates could be greatly enhanced, had they been bound after the manner of the loose leaf ledgers, rather than in the ordinary book form, as the continual resort to the register and key, in their perusal, becomes wearisome

at times. While the real searcher after truth acknowledges no obstacles, there are many of us who need encouragement to stick to a thing, and a little extra work of this character gives us a ready incentive to quit early. We did not, however, and were amply repaid by a careful perusal of the volume. The plates showing tuberculosis are especially good, and suggest the regret that pictures of the gross appearance of the eyes from which these specimens were taken were not available to complete the study, even though this phase of the pathology is not within the scope of this work. Plate 33 showing the end results of the Elliot operation and iridectomy by keratome, and by Graefe knife, is especially pleasing to the reviewer. Altogether, the work may be said to have attained the objective its author sought, and will amply repay its possessor in the definite information it unfolds.

L. W. F.

The great need for this book has been very clearly stated in the introduction by Prof. Fuchs. "Pathological anatomists have given the eye very little attention. The pathological anatomy of the eye is essentially the work of the eye doctor. Starting with the clinical procedures so well known to him, he is the most capable of understanding and analyzing the anatomical changes found and then by reversing the process of thought to visualize these anatomical changes in the clinical study of the diseased eye, a thing which it seems to me is always to be striven for. I noted the great interest which eye doctors have in pathological anatomy on the occasion of the lectures on this subject I held in the United States during the year past. The wish was often expressed there that I might bring out an atlas on the pathological anatomy of the eye. The atlas presented by my son gives the anatomical findings of the most important eye diseases and rightly omits the curiosities. It is the first atlas of pathological anatomy of the eye with colored drawings holding as well to the strict requirements of artistic procedure. The experienced histologist can understand how to read the essentials out of uncolored drawings but for the inexperienced the color is the principal means of differentiation between the individual tissue elements." The subject material is extremely well chosen and includes practically all the important processes affecting

the eyeball proper. Trachoma and gonorrheal ophthalmia are not presented, apparently because they are primarily diseases of the lids. The coloring is that obtained after hematoxylin-eosin staining and has been beautifully reproduced. It is so delicate that one makes a mistake to study the plates by anything except good daylight, just as with well stained specimens. The text, of which an authorized English translation by Hans Barkan of San Francisco is now also available, comes in a separate unbound folio, contains first a clear clinical history of the eye from which the specimen was obtained and this is followed by a well balanced and thoroughly satisfactory anatomical description, not too detailed yet ample. One does well to read the clinical notes, then turn to the colored plate, study each tunic, make up a mental picture of what the description should be, then return to the text description for the author's elucidation. The work is far more than an atlas because on almost every page one finds astute observations which go deep into the root of things ophthalmological, dealing as they do with the grand symposium of clinical and anatomical facts. Among such one finds the following: The eye does not shrink, even when bone forms throughout its back half, if the ciliary processes still function; choked disc in atrophi bulbia is due to hypotony; the veins of the orbit have no valves, hence meningitis after panophthalmitis; the enlarged blind spot of papillitis is due to displacement of the peripapillary retina; any cut through the ciliary body as in trephining, extraction of a backward displaced lens, or in wounds, is dangerous even when there is no infection because the repair membranes form and may detach the retina; the ciliary processes are "frequently" prolapsed in the Elliot trephining; the lens capsule gets into the wound easier after complete than after partial iridectomy; anterior capsule proliferation may cause loss of vision years after extraction, from shrinkage, hence remove the capsule; the loss of the periphery of the field of vision following a choked disc is due to the early atrophy of the marginal bundles of the optic nerves; "many" cases of sympathetic ophthalmia have typical anatomical findings only in wholly isolated areas so many serial sections must be studied; glioma and sarcoma can become completely necrotic within the eye from increased

tension, lack of vascularity, toxins of already dead tissue or combinations of these factors.

The work deals essentially with microscopic anatomy rather than with histology, yet there is much helpful histologic matter, as for instance that the plasma cell can be certainly differentiated from plasmatoid cells by its juxta-nuclear vacuole; the leucocytes in luetic iritis are not hematogenic but are derived from adventitial cells of blood vessels; the greater richness of the cell protoplasm in a sarcoma differentiates it from a melanoma; a red center and blue margin in a glioma node, the reverse of the usual finding, occurs when the node lies detached in an albumen rich fluid; the Langhans giant cell of tuberculosis is formed by confluence of proliferated and degenerated capillary endothelium, whereas the ordinary cell is derived from epithelioid cells. After a very ample presentation of tuberculosis and sympathetic ophthalmia, there is an excellent discussion of their differential diagnosis.

Among newer subjects there is presented a case of experimental dendritic keratitis and one of asteroid hyalitis. Along controversial lines the author takes the stand that the early perforation of deep abscess in ulcus serpens is from before backward and not from the hypopyon forward; that pannus degenerativus always lies anterior to Bowman's membrane. Probably through pure oversight there is no mention of the calcification frequent in glioma.

The work gives evidence of the greatest care in preparation and along with the forthcoming authorized English translation will be of the greatest value to students of Ophthalmology the world over. E. V. L. B.

VII.—**La Tuberculose du Tractus Uveal** (Uveal Tuberculosis), by Dr. Henri Lagrange, Paris. 183 pages. Gaston Doin, Paris, 1924. Price 25 francs net.

This is a study of tuberculosis of the uveal tract based on anatomic, clinical and experimental data. The author believes that these lesions in their growth tend to leave the eyeball in a characteristic way before invading the orbit. Lagrange repeated the well-known investigations on animals without arriving at any new results, but in trying out sensibilization of the rabbit with tuberculin and protein substances he found that while the healthy rabbit is not sensitive

to dead tubercle bacilli or tuberculin injections, the allergic animal, after injection of these bacterial bodies in the anterior chamber reacted with great violence which the author describes as superinfection. Furthermore, the tuberculous lesions in the uvea suggest a superinfection in a tissue modified by a previous attack. The term superinfection is used to describe the effect of inoculation with the tubercle germ in a subject who at one time had suffered from a primary tuberculous infection and in this case it defines the affection as that of a part, up to then unaffected, by germs coming from a primary focus. The histology of experimental lesions in an allergic field resembles those observed clinically. The local tuberculous manifestations are determined by the phenomena of immunity. Kuss believes that uveal tuberculosis is the result of a deep focus and is proof of an acquired infection but which has proved unobserved. The new lesion may result from the mobilization of bacteria in an old focus or from a new contamination. Secondary and primary lesions must not be confounded. The differences are due to immunity established by the first infection. Miliary tuberculosis of the choroid or of the iris represents participation of the uvea to generalization of bacillary infection as occurs in severe primary infections and in anergic subjects.

This study includes those forms of uveal tuberculosis occurring in allergic subjects and therefore are examples of superinfection. The inoculation of the anterior chamber of a non-anergic rabbit with tubercle bacilli causes the slow development of diffuse lesions rich in bacilli, while in the case of inoculation of the allergic animal, the so-called superinfection causes an active reaction in the shape of localized lesions which rapidly progress and in which the bacilli are difficult to find. The experimental lesions obtained resemble those found in pathological eye sections. The general character of these lesions of superinfection in tuberculosis of the uveal tract resemble pathologically and bacteriologically local tuberculosis or what is generally spoken of as surgical tuberculosis. A. K.

VIII.—**Die Augenärztliche Therapie** (Ocular Therapeutics), by PROFESSOR E. FRANKE, Hamburg. 139 pages. Julius Springer, Berlin, 1924. Price $1.15.

This is a brief presentation of the treatment of eye diseases omitting the optical and operative parts. It is quite complete, and includes general treatment in tuberculosis, syphilis, sero- and organotherapy, protein body therapy, X-ray and radium, the application of cold and heat and the various agents used locally. An alphabetical list and a short description of the individual drugs is given. Finally in a special part, the various parts of the eye and their diseases are treated in turn. The little book contains a great deal of information which the practising oculist will find of great assistance. The author has purposely avoided a critical consideration of the various methods of treatment, which in the reviewer's opinion is to be regretted. A. K.

IX.—**Report of the Government Ophthalmic Hospital, Madras,** 1923, by MAJOR R. E. WRIGHT, Superintendent. 23 pages. Printed in Madras, 1924.

During the past year there were treated 4096 in-patients and 21,576 out-patients. 1613 cataract operations were performed; most of these (1452) were extracted according to the Madras method (preliminary capsulotomy, limbal section, and complete iridectomy) with vitreous loss in 18. 24 Barraquers were done, with vitreous loss in 3. Smith operation in 2. Peripheral (button-hole) iridectomy in cataract extraction offers the following advantages, the round pupil gives better refractive results and prevents entanglement of capsule or cortex in the wound, slightly less risk of vitreous loss; it makes the irrigation of the cortex remnants more difficult, with greater tendency to resulting after-cataract and other changes from retained equatorial cortex. According to the figures the conjunctival flap did not offer any protection against infection. 138 sclerocorneal trephinings were performed; Herbert's sclerotomy (wedge isolation) was done in 36. Late infection after trephining was met with in only 3 cases since 1921 (471 trephinings). Sympathetic ophthalmia seems to be a very rare occurrence in India. A description of fundus diseases and report of interesting clinical cases (quinine amblyopia, keratomalacia, conjunctival cysticercus, Parinaud's conjunctivitis) complete the year book.

A. K.

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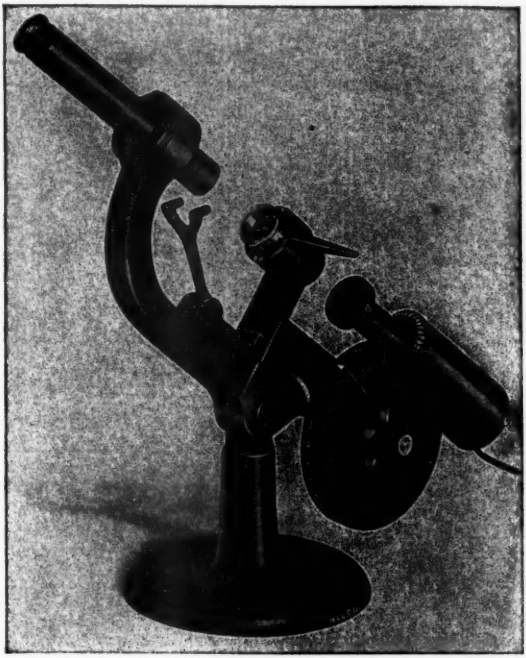

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